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SUMMARY OF RECENT ABSTRACTS*

III. MALARIA

General

RUSSELL (p. 734) has written a small but important book on malaria, which is an excellent exposition of the subject. He (p. 1020) traces the history of Italian contributions to malariology.

A complete issue of the *British Medical Bulletin* (p. 353) was devoted to recent research in malaria, chapters being contributed by the British workers who have been closely associated with such research.

In the report of the East African Malaria Unit for 1951, WILSON (p. 913) gives an account of the training of African staff, and of the research which has been undertaken in the bionomics of *A. gambiae* and *A. funestus*. Surveys have been undertaken in various places, and experiments have been made on the use of insecticides.

Epidemiology and Immunity

MACDONALD [this *Bulletin*, 1950, v. 47, 907, 915 ; 1952, v. 49, 569, 813] has written a series of papers in which the various factors which may influence the incidence and intensity of infectious diseases, including malaria, are subjected to mathematical analysis. In the first the relationship between the amount of infective material to which a population is exposed and the resulting infection rates is considered, and in the second the theory developed to comprehend these factors is applied to malaria. The possibility of superinfection is an essential factor in these considerations, and comparison of theoretical with actual findings indicates the general correctness of the theory. In the third paper the factors which influence the sporozoite rate are examined and related to each other, and in the fourth there is an analysis of equilibrium in malaria and a classification in terms of stability or instability, according to the characteristics of the vectors. These papers should be read in full ; they form a notable contribution to the attempts hitherto made to measure the relative importance of various epidemiological factors in disease, malaria being taken as an example of a system which, *mutatis mutandis*, could be applied to other conditions.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1952, v. 49. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

VISWANATHAN (p. 1022) differentiates between antitoxic and antiparasitic immunity in malaria. His view is that in hyperendemic areas where natural selection favours survival of the most resistant, infants inherit antitoxic immunity which, by raising the pyrogenic threshold and mitigating the cellular reactions, delays the development of antiparasitic immunity. The result is high parasite density without gross splenomegaly or evident illness in children ; antiparasitic immunity develops later and causes the typical fall in parasite density associated with adult life. The author goes on to show that in one area of India where transmission by *A. fluviatilis* is perennial, one group of aboriginal tribes displays this pattern, but another group of people more recently introduced does not show the same degree or pattern of immunity. He has applied the formulae of MACDONALD [this *Bulletin*, 1950, v. 47, 907] to data collected in another area (Assam), and from consideration of the curves obtained he suggests that there may be a transient antiparasitic immunity in infants under 2 months, which is probably humoral and inherited. It probably occurs only where transmission is perennial. He gives a classification of malaria on the basis of endemicity, which includes a category " superendemic ", applied to communities in which tolerance to parasitic invasion has been developed, as described above ; the characteristics are child spleen rates over 75 per cent., and low adult spleen rates and sickness rates.

SERGENT (p. 925) defines latent infection, which is the condition of the host after the combat with the parasite has ended, when the disease is over and the infective agent has withdrawn into hiding. This state may persist for years, and in it there is the special type of immunity known as premunition, which depends upon the continual presence of the antigen in the body, in contrast to true immunity in which the antigen is destroyed. Latent infection is of value to the individual because of this premunition, but it is a danger to the community because it entails a hidden reservoir of disease.

SHIBATA (p. 358) has analysed mathematically the results of his studies of the frequency of spleen sizes in association with spleen rates.

Distribution

RUSSELL (p. 749) reviews the present status of malaria in the world, and MACARTHUR (p. 356) has written a short account of malaria in England, and of the causes of its decline.

Malaria still occurs in North Rhenish Westphalia, and TRÜB and WANJURA (p. 219) report autochthonous cases in the period 1946–50.

MILLETARI (p. 104) describes malaria in Sicily, where in 1951 there were 5,406 primary cases and 20,400 relapses, and where the anophelines are *A. maculipennis labranchiae*, *A. superpictus* and *A. claviger*. DDT spray has led to great improvement but will probably not be able to eradicate the disease, though the control thus established will allow time for integral bonification to be carried out.

Papers on the experimental station of the Pasteur Institute of Algeria and the malaria situation there, are contributed by SERGENT and COLLIGNON (p. 220) and by COLLIGNON and JUILLAN (p. 476).

BRUCE-CHWATT (p. 221) gives an account of malaria in Nigeria, where the southern belt of the country is hyperendemic and the northern area affected, but to a slighter degree. Almost all cases are due to *P. falciparum* (96 per cent.) or *P. malariae*. Transmission is perennial on the coast, seasonal in the north, and the vectors are *A. gambiae*, *A. melas* and *A. funestus*. There is a special malaria service.

JONCHÈRE and PFISTER (p. 590) investigated malaria in three areas of French West Africa where it was extremely prevalent, noting that the general condition

of infected children was good. The common parasite was *P. falciparum* and the common anophelines were *A. gambiae* and *A. funestus*, with sporozoite indices of 12·25 and 6·07 per cent. respectively.

JADIN and FAIN (p. 220) write of malaria at high altitudes in Ruanda-Urundi where *A. funestus* is the chief vector. Parasite rates ranged from 36 to 65 per cent.

In South-West Africa the highest incidence of malaria is in the north, and the part of the country south of latitude 19°S. has low incidence, but is subject to epidemics. *P. falciparum* caused 91 per cent. of the malaria seen in the survey reported by DE MEILLON (p. 105) ; *P. malariae* is restricted to the north. The presumed vectors are *A. gambiae* over the whole country, with *A. funestus* along the rivers in the north. The author gives a list of anophelines found. The climate, in general, is of desert type, with hot days and cold nights.

RAINA (p. 210) in a monograph discusses the malaria problem in India.

A survey of Jammu and Kashmir is reported by JACOB (p. 107), who found a patchy distribution and spleen rates from 0 to 60 per cent. *A. fluviatilis* is probably the vector, and *A. culicifacies* (which is not found above 4,000 feet) has been incriminated ; the transmission season is July to September. RAFI and NASIR (p. 1093) show that in part of the Punjab the incidence of malaria is closely associated with the state of the stormwater channels ; along these, in the monsoon season, the level of sub-soil water is raised and thus are created extensive breeding places for *A. culicifacies* in ponds and flooded lowlands associated with irrigation systems. A survey of villages along one such water course illustrates this fact.

RAJENDRAM and JAYEWICKREME (p. 749) give an account of the epidemiology of malaria in Ceylon, with particular reference to one of the river valleys.

JONES (p. 107) has made a survey of Kyaukpyu, Burma, where spleen rates vary from 12 to 70 per cent., and gives reasons for thinking that *A. sundaicus* is the vector.

The Annual Report of the Malaria Advisory Board, Malaya (p. 750) shows that there has been a progressive decline in incidence since 1947, but in commenting on this, Macdonald points out that there have been great variations in incidence in the past, and suggests that more information is needed before an estimate of trends can be given with confidence.

HUANG (p. 1021) reports on a survey of malaria in part of Hainan Island, where a general parasite rate of 26·1 was found. *A. minimus* was the commonest anopheline taken in human dwellings, and showed an infection rate of 10·8 per cent.

A note on malaria in the Northern Territories of Australia has been written by LEE (p. 661).

Recent reports from the United States indicate that indigenous malaria is now very rare, though a few cases did occur in 1949 and 1950 (QUINBY and WELCH, p. 923). SCHOOF and ASHTON (p. 591) refer to the last outbreaks of malaria in S. Carolina, in 1943.

BLUMBERG *et al.* (p. 838) give information on certain " bush Negroes " living near bauxite mines in Surinam ; the malaria rates in those living near the mines were lower than in those further away, probably because the former received more treatment.

Transmission

The book on mosquito behaviour by MUIRHEAD-THOMSON (p. 336) deals very largely with subjects of importance in malaria.

In new sporozoite-induced infections with *P. vivax* (Chesson strain) JEFFERY (p. 1094) obtained infection of *A. quadrimaculatus* about 4 days after

parasitaemia began and 2 days before gametocytes could be detected by ordinary methods. In relapses, infectivity to mosquitoes occurs earlier.

SHUTE and MARYON (p. 358) have studied the transmission of *P. malariae*, noting that for the infection of mosquitoes (which is difficult) some quality of the gametocytes, rather than quantity, is important. They describe the oöcysts and sporozoites, and give an account of the time taken in development in the mosquito, and the incubation period in man. The same authors (p. 1095) describe the appearances and diagnostic features of the oöcysts of the various human malaria parasites and of some monkey parasites. This is an important paper which should be read in full.

SINGH *et al.* (p. 480) use human plasma in place of human serum as antigen for the preparation of precipitin sera. It is effective and much more readily available.

AITKEN (p. 7) shows how eggs of the *A. maculipennis* group may be collected by dipping, and identified. This is a simpler procedure than collecting females and waiting for them to oviposit. GUELMINO (p. 224) discusses the phenomenon of gonotrophic dissociation in hibernating *A. maculipennis*.

HEINZ (p. 592) has made a study of the distribution of *A. maculipennis* in Hamburg.

Accounts of the biology of *A. maculipennis atroparvus* on the coast of Poland and the overwintering of the female have been published by LACHMAJEROWA (pp. 108, 838). Considerable detail is given in the original abstracts. EICHLER (p. 225) describes the salt-water tolerance of *A. m. atroparvus* in southern Russia.

In searching for the explanation of the fact that in Sardinia *A. m. labranchiae* has been found in places previously reported clear, TRAPIDO (p. 478) shows that when larvae are rare they may not be found until hundreds or even thousands of dips have been made. Negative reports by single scouts searching several breeding places in one day may therefore be erroneous. He also shows that anopheline larvae dive to the bottom of the water when disturbed, and some species may remain there for a minute or more, though *A. m. labranchiae* cannot usually remain submerged for more than a few seconds. Larvae may therefore be missed on repeated dipping, because they have dived.

A series of attempts by MARYON *et al.* (p. 477) to induce hybridization between *A. maculipennis atroparvus* and *A. quadrimaculatus* were not successful.

DE MEILLON (p. 109) has written an account of the malaria vectors of Africa, and their bionomics. Three groups are recognized, the principal vectors (*A. gambiae* and *A. funestus*), the vectors which are important only in some restricted areas where the principal vectors are rare or absent (*A. brunnipes*, *A. melas*, etc.), and the anophelines which are primarily exophilic, and are unimportant. In a somewhat similar manner HOLSTEIN (p. 105) divides the anophelines of French West Africa into major vectors (*A. gambiae*, *A. funestus* and *A. rufipes*), secondary vectors (*A. nili* and *A. pharoensis*), and accessory vectors (*A. hancocki* and *A. domicolus*). Speen rates and parasite rates up to 40 per cent. are reported in the Bobo Dioulasso district.

CAMPBELL (p. 226) recognizes two groups of *A. gambiae* in Gambia, one with a relatively low maxillary index (13·107) and one with a higher index (15·33). There was a tendency for the latter to breed in more permanent pools than the former, and they were more commonly taken in spray catches in houses, and less commonly in window traps, than the 13·107 group. This may be because the 15·33 group from permanent water was compelled to fly further to reach the houses, and indicates that fatigue may have caused them to rest inside houses. [It will be remembered that HOLSTEIN (*WHO Monograph No. 9, 1952*), distinguishes two forms, one paucidentate and man-loving, the other multidentate and animal-loving; these also differ in choice of breeding places.] BERNET (p. 593) also refers to the fact that to some extent and in some seasons

A. gambiae is distinctly zoophilic. He regards it as a "wild" mosquito capable of maintaining itself on animals but feeding on man when present, and thriving. It may feed on man out of doors, and may rest in houses or uninhabited buildings, and in any campaign of control these uninhabited buildings should be taken into account.

In Tanganyika, PHIPPS (p. 226) reports studies on the breeding of anophelines, especially *A. gambiae*, on the survival of larvae, and on the effect of various predatory animals in the waters. Temperatures, and chemical and botanical characters of the breeding places are given. BERNET (p. 479) makes the point that *A. gambiae*, far from being discouraged by human activities, takes advantage of the increased opportunities for breeding which they provide.

THOMAS (p. 359) reports preliminary work which indicates that *A. gambiae* probably prefers to feed on adult persons rather than children.

The predominating anophelines in south-east Urundi are *A. funestus* and *A. gambiae*; LAMBRECHT (p. 1094) gives information on the seasonal variations in infectivity of these two species.

In Italian Somaliland the intensity of malaria varies from place to place. *A. gambiae* is the chief vector, but *A. funestus* is also found, and other less important anophelines. *P. falciparum* is the predominant parasite (MOISE, p. 837).

SENIOR WHITE and ADHIKARI (p. 109) show that catches at Indian railway stations indicate that anophelines, some of them vectors of malaria, are carried long distances by train and may be found in station waiting rooms far from their usual haunts.

The vectors of malaria in West and East Pakistan are discussed by HUSSAIN (p. 227).

PRINGLE (p. 359) suggests a method for distinguishing larvae of *A. stephensi* from those of *A. superpictus*.

In environmental experiments, DAKSHINAMURTY and SHARMA (p. 1001) show that unfed, freshly emerged female *A. stephensi* and *C. fatigans* had a tendency to prefer higher rather than lower humidities, except that full saturation was not sought. This was true at temperatures above 30°C.; below that, both species were mostly inactive, and showed no tendency to prefer one or other of two different humidities. When offered a choice of temperatures, however, both preferred 25°C. rather than 30°C. They sharply avoided higher temperatures.

An illustrated map of the anophelines of Indonesia has been issued by the Ministry of Health of Indonesia (p. 8).

BONNE-WEPSTER (p. 110) proposes the name *A. venhuisi* for the mosquito formerly known by Venhuis as *A. hyrcanus X*.

The four common anophelines of Hong Kong are *A. maculatus*, *A. hyrcanus sinensis*, *A. minimus* and *A. jeyporiensis*. All have been found infected, but the last two are the most important (JACKSON, p. 8). In Formosa malaria transmission is highest in April–May and October–December. *P. falciparum* is the commonest parasite in schoolchildren and the important vectors are *A. hyrcanus sinensis* and *A. minimus*, though *A. sundaicus*, *A. annularis* and *A. tessellatus* may also transmit infection (WATSON and LIANG, p. 223). CHANG *et al.* (p. 110) discuss the seasonal prevalence of anophelines in Formosa, where 16 species are known. *A. hyrcanus sinensis* had two seasonal peaks, spring and autumn, and its seasonal prevalence is affected by agricultural practice, since it breeds in irrigated rice fields. *A. minimus* is most prevalent in May; it is the vector in the hills. The same authors (CHOW *et al.*, p. 111) found malarial infection only in *A. hyrcanus sinensis* and *A. minimus* in Formosa, and in very low proportions.

Tseng Sheng and Wu (p. 228) discuss mosquitoes of part of central China, where *A. hyrcanus sinensis* is the vector of malaria.

McArthur (p. 227) discusses the importance of the various species of *Anopheles* in Borneo, with reference to the literature from 1914 to 1949. *A. leucosphyrus* is the chief vector in most of the area, and *A. sundaicus* and *A. umbrosus* have local importance. Colless (p. 110) describes the 7 varieties of *A. leucosphyrus*, of which *balabacensis* is the only one involved in transmission in N. Borneo. *A. l. leucosphyrus* may be a vector in Malaya.

It seems probable that drying for one week will kill the majority of eggs of *A. quadrimaculatus* (Kartman and Repass, p. 1094).

Chang and Richart (p. 479) discuss the "notched organs" of the larva of *A. quadrimaculatus*, which are the future respiratory trumpets of the pupa; Fair and the same authors (p. 480) discuss the mechanism involved in flotation of these larvae.

Anduze (p. 9) in Venezuela distinguishes two new varieties of *A. aquasalis*, for which he proposes the names *guaraúno* and *delta*. de Oliveira *et al.* (p. 594) report a study of the waters in which *A. aquasalis* breeds.

In Surinam the permanent breeding places of *A. darlingi* are along the large rivers south of the savannah belt which is itself south of the marshy coastal region. The savannah belt forms a natural barrier preventing *A. darlingi* from spreading northwards, but in the rainy season it can spread along the rivers, though not easily along narrow creeks. Bruyning (p. 1022) notes that the construction of canals and reservoirs may encourage invasion by this mosquito.

In a survey of the valley of the São Francisco, Brazil, the anophelines caught in houses comprised *A. darlingi* (85 per cent.), *A. albitarsis* (12), *A tarsimaculatus* and *A. triannulatus*. The parasite index in the population was 6·54 per cent., but was as high as 41 in one locality. Infections were due to *P. vivax* (82 per cent.), *P. falciparum* (15) and *P. malariae* (3) (de Lucena and Costa, p. 7).

Aetiology

Shortt (p. 224) has given a vivid account of his experiences in research on the tissue phases of malaria parasites. This personal story should be read in full.

What is probably an abnormal strain of *P. vivax* is reported from Pakistan by Mohi-Ud-Din and Rahim (p. 477).

Lüdicke and Piekarski (p. 839) describe the nuclear processes taking place in the course of gamete formation and fertilization of *P. falciparum*.

A strain of *P. falciparum* which lost the power to form gametocytes after a number of direct passages from man to man, and which was thereafter incapable of transmission by mosquitoes, is described by Jeffery (p. 840).

Pathology

Maegraith *et al.* (p. 111) contend that anoxia can cause centrilobular lesions of the liver, and that malaria is one of the causes of anoxia which can produce this effect. They sum up the present state of their work on this subject. They doubt whether the anaemia of malaria can account for this condition, and they do not think that the fact that the parasites themselves use oxygen, or that they interfere with the dissociation curve of oxyhaemoglobin, can explain it. Impairment of oxygen supply may result from retardation of blood flow through the liver, and the authors have studied the hepatic circulation by new techniques, which indicate the importance of venous constriction and neurohumoral control of the hepatic circulation, and suggest the existence of a vascular shunt mechanism. Details of their findings should be sought in the

original. In comment Glynn advances the view that though the opinions expressed may be correct, there is not yet sufficient information to prove that malaria can produce an adequate degree of anoxia and maintain it for long enough to cause these effects. ANDREWS and MAEGRAITH (p. 662) have continued their work on the liver circulation by studying the response to perfused adrenaline and acetylcholine. JONES, MAEGRAITH and SCULTHORPE (p. 756) have used the Warburg apparatus for blood-oxygen determination, and (p. 757) have investigated the utilization of oxygen by rat blood infected with *P. berghei*. They conclude that the amount used by the parasites probably was not sufficient to affect the host directly.

In patients with acute malaria who were given various tests of liver function WAHI and ARORA (p. 925) found that only 10 per cent. showed no deviation from normal. The same authors investigated chronic malaria (p. 926) and found similar evidence of hepatic dysfunction. In comment Lehmann points out that the tests used were chiefly those which measure alterations in the gamma-globulin level, and are directly connected with the function of the reticulo-endothelial cells, lymph glands and spleen, *i.e.*, the cells and organs which produce gamma-globulin. He wonders whether it is justifiable to assume liver disease on these grounds in chronic malaria in which involvement of the R.E. cells and spleen would in any case be expected. PINNA (p. 113) states that signs of hepatic involvement are more marked and occur earlier in malaria attacks in children than in adults. He describes 6 children in whom jaundice complicated the clinical attack.

A study of bone marrow in induced *P. vivax* malaria is reported by CURCIO and POLOSA (p. 229). There is proliferation of erythroblasts owing to increased destruction of erythrocytes.

BUENO GARCIA (p. 481) and CORCOS and CITTANOVA (p. 594) discuss malarial nephropathy.

Diagnosis : Clinical findings

WILCOX (p. 113) has published the second edition of her Manual for the Microscopical Diagnosis of Malaria in Man, and JASWANT SINGH (p. 9) writes on the technique of making and staining blood smears. CHARDOME and JANSSEN (p. 1095) refer to the value of skin scarification smears in the diagnosis of malaria. KRÜPE (p. 840) agglutinates the red cells in thick blood smears by means of agglutinating rabbit serum before staining them. The parasites are less shrunken than by conventional methods. A method of staining trypanosomes and malaria parasites in tissue sections is described by LOEHNING and VAN BAAREN (p. 910).

Discussing the diagnosis of malaria in French West Africa, and the danger of " sending a patient to the tomb because of a negative blood slide ", BERGERET (p. 10) shows that malaria parasites may be found in the bone marrow of a considerable proportion of children with negative blood smears.

Several authors, EDDLEMAN *et al.* (p. 229) ; HALL and LOOMIS (p. 838) ; and AQUILINA and PAPARELLA (p. 1024), report *P. vivax* malaria with long incubation periods or latent periods (up to about 10 months in duration) in American soldiers who had returned from service in Korea. Some, but not all, of them had taken chloroquine regularly ; some were experiencing the primary attack, and some a relapse.

EYLES and YOUNG (p. 480) show that in cases of untreated or inadequately treated *P. falciparum* infection (induced for therapeutic purposes) parasitaemia persisted for 222 ± 25 days and in some cases for more than a year ; the first period of continuous parasitaemia lasted 121 ± 9 days, after which it was intermittent. RAFFAELE (p. 840) has also used *P. falciparum* for malaria therapy in patients not sufficiently susceptible to *P. vivax*, and gives an account of the

clinical course of the attacks ; many pernicious symptoms were observed, which were controlled with quinine.

SHIBATA (p. 841) has analysed mathematically the frequency and periodicity of relapses and recrudescences in malaria.

TORRES ESTRADA (p. 841) writes on supra-orbital neuralgia in malaria, and gives details of 300 cases. It seems that parasites were not always found in these cases, but as anti-malarial treatment was usually successful, the author thinks that supra-orbital neuritis, in the absence of sinusitis or other obvious cause, should make one think of " masked malaria ".

A review of the subject of congenital malaria has been written by JAHIER and FABIANI, p. 1095. *Charles Wilcocks*

MALARIA

REED, F. S. **A Malaria Survey of Infants in Ibadan, Nigeria.** *West African Med. J.* 1952, July–Aug.–Sept., v. 1 (n.s.), No. 3, 127–30, 1 graph.

Ibadan (7°N. 4°E.) the largest town in West Africa, lies at the northern fringe of the Southern Nigerian coastal rain-forest, has a rainy season from April to October and a population of half a million with a density of 2,000 per square mile.

A random selection from infants attending an Infant Welfare Clinic enabled a total of 200 up to 18 months of age to be examined for evidence of malaria infection : 53 were 8 months and over, and 37 of them had parasites in the blood and 21 had enlarged spleens. The results for the remainder under the age of 8 months were :—

Age in months	1	2	3	4	5	6	7
No. with parasites in blood ...	2	3	9	6	10	7	10
No. with palpable spleens ...	0	0	2	2	5	5	2
Total examined	20	35	29	18	15	12	18

The proportion infected rose steeply after the third month. Seventeen per cent. had clinical malaria at the time of the random single examination : 12 per cent. had acquired some degree of immunity before the 18th month but the majority had had intermittent attacks of malaria resulting in much debility and ill health. The infant mortality rate is believed to be about 350 per 1,000 births, the commonest cause of death according to the mothers being diarrhoea and convulsions. It is worth consideration whether it would be advisable to give these children regular prophylaxis for the first year of life, presuming that in the second year they can build up immunity with less loss of life and health than at present. *R. Ford Tredre*

ATCHLEY, F. O. **Densities of *Anopheles*, Sporozoite Rates in *Anopheles*, and Incidence of Malaria in an Area of South Carolina.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 743–6.

Between the years 1947 and 1950, more than 20,000 blood films were examined in a formerly malarious area bordering the Santee Reservoir in Clarendon County, South Carolina. For these years the percentages of films positive for malaria were 0·39, 0·04, 0·01, and nil.

A total of 34,808 *A. crucians* showed a sporozoite rate of 0·09 per cent. ; of 20,103 *A. quadrimaculatus* 0·05 per cent. showed sporozoites in the salivary glands. The authors note that the disappearance of malaria-positive human blood films was not accompanied by a significant decline in the sporozoite rates of the anopheline mosquitoes during the years 1947–50. The identity of the sporozoites noted in the wild-caught anophelines is not known. A number of inoculations were attempted in which animals, human volunteers and birds were used, without subsequent infections. No significant differences were observed as to time and places of collection of the positive specimens of the two anophelines. *R. Ford Tredre*

LACHMAJER, J. **Age of Population and the Number of Generations of *Anopheles maculipennis atroparvus* v. Thiel in the Environments of Gdańsk in 1949/50.** *Bull. State Inst. Marine & Trop. Med., Gdańsk, Poland.* 1952, v. 4, No. 2, 211–12. [Also in Polish 209–10 & Russian 210–11.]

In Gdansk (Danzig) the author found *A. m. atroparvus*, *A. m. messeae* and *A. m. typicus*, comprising 76·6, 22·9 and 0·5 per cent. respectively, during the period of development (May to September). Even the oldest female specimens laid eggs 5 or 6 times. In 1949, the first generation began at the end of May, when the average size of the ampullae of the paired oviducts was lowest : it was largest in July.

The first females of the second generation appeared at the end of July and breeding continued until early August : the average size of the ampullae decreased during this period. Towards the end of August, sexually inactive females appeared and increased in number during September. In the middle of September, the average size of their ampullae decreased greatly and many males appeared : this was the beginning of the third generation, which lasted until November.

Many of the active females of the second generation passed into diapause during November and few survived the winter. Young females were more numerous during the winter and the average size of their ampullae did not exceed 0·008 mm. The physiologically older females may have been infected by malaria after several blood meals. *H. J. O'D. Burke-Gaffney*

See also p. 250, NASIR-UD-DIN, **Mosquitoes Breeding in Tree-Holes and Bamboo Stumps in Dacca (East Pakistan).**

COLLESS, D. H. **Observations on the Periodicity of Natural Infections in the Anopheline Mosquitoes of Borneo.** *Med. J. Malaya.* 1952, June, v. 6, No. 4, 234–40, 2 figs.

"1. The relationship between adult density and sporozoite rate in *A. balabacensis* suggests that adult longevity, as conditioned by climate, has a considerable effect upon the infectivity of this species.

"2. Available information suggests that infectivity in *A. sundaicus* is similarly affected, and that this species, on Labuan Is. at least, has a normal life-span balanced rather critically around the minimum period for acquisition and maturation of infections.

"3. If the above conclusions are correct, it should be possible to effect a significant lowering of malaria transmission by such methods as destruction of adult resting sites, particularly in the case of *A. sundaicus*."

See also p. 251, BLAKESLEE, **Chloride Ion Tolerance of Four Mosquitoes of Okinawa.**

BARR A. R. **The Thermal Death Times of the Aquatic Stages of some American Dark-Winged Anophelines.** *Amer. J. Hyg.* 1952, Mar., v. 55, No. 2, 170–81, 2 figs. [24 refs.]

The author is interested in the North American Anophelines of the dark-winged or "*maculipennis*" group, that is to say in *A. quadrimaculatus, aztecus* and *freeborni*, of which the two latter are generally regarded as particularly close to one another. He has established colonies of the 3 species available and has made a comparison in the length of life of the aquatic stages when exposed at a temperature of 42°C., which was found to be fatal to all of them after a longer or shorter time. The results are set out in considerable detail and studied in a thorough and statistical manner. The first larval instar survives a longer period than the second, third or fourth, the pupa surviving a short period, not differing greatly in that point from the fourth larva. For instance, in *A. quadrimaculatus* the period necessary to kill 50 per cent. of the first instar larvae at 42°C. was just over 18 minutes : this fell during each successive larval stage to 7 minutes in the fourth larva and 4·7 for the pupa. It is also shown that at any one stage *A. quadrimaculatus* tends to survive for a longer period than *freeborni* which in turn survives for a longer period than *aztecus*.

The explanation of these carefully established facts is not entered into. The paper contains a full review of previous work on the relation of temperature to various parts of the life history of mosquitoes. *P. A. Buxton*

VAN HOOF, L., PEEL, E. & CHARDOME, M. Recherches sur la malaria chez des enfants morts à l'Hôpital de Léopoldville. [**Studies on Malaria in Children dying in the Leopoldville Hospital**] *Ann. Soc. Belge de Méd. Trop.* 1952, June 30, v. 32, No. 3, 289–95.

This paper gives a useful summary of the causes of death of 165 children aged 0 to 2 years (and one of 7 years) seen in hospital in Leopoldville.

The studies were accompanied by a search for exo-erythrocytic schizogony in malaria, particularly in smears or sections of liver, spleen, kidney, lung, heart, brain and bone-marrow. The smears were stained for at least an hour with May-Grünwald-Giemsa, if necessary after treatment with ether to remove excess of fat. No unequivocal evidence was obtained of this cycle, though unpigmented parasites, free or in phagocytes, were sometimes encountered. Likewise not a single case of congenital malaria was found, although most of the mothers were infected with *Plasmodium falciparum*.

Children received anti-malarial treatment which often cleared the blood of parasites, though schizonts in large numbers were found later at post-mortem examination in smears of the myocardium or of other organs. The former was sometimes like a malaria culture in degree of parasite development and intensity.

Causes of death are discussed, and in the group comprising 96 children of 11 months and under, 9 were thought to have died of malaria. Children of 3 months and under showed no evidence of this disease. Tuberculosis was suspected in several children, and the Weil-Felix (*Proteus OXK*) reaction was positive in 17—in 4 children under a week old, and in 2 older children actual eschars were visible. Other causes of death included pneumococcal septicaemia, bacillary and amoebic dysentery, anaemia, cachexia, congenital syphilis, hydrocephalus. *P. C. C. Garnham*

SHUTE, P. G. **Malarial Fever Therapy.** *Lancet.* 1952, Aug. 16, 333–6, 4 figs.

This paper has been written because recent work has shown that induced malaria may be useful in the treatment of nephrosis and the demand for this form of treatment has correspondingly increased.

Patients may be infected either with mosquitoes or whole blood. When the former are used it is stated that a hot water bottle should be placed against the patient's thigh for 1–2 hours before biting and that no other preparation is necessary. *Plasmodium vivax* infections with the Madagascar strain only are used by the Malaria Reference Laboratory, Horton, and this parasite is known to be susceptible to mepacrine, quinine, proguanil, and "Daraprim" (pyrimethamine).

When blood containing malaria parasites is employed, approximately 5 ml. are withdrawn from one of the donor's veins ; this is either defibrinated, citrated or heparinized and is then injected intramuscularly into the recipient. It is recommended that the syringe used be bathed in cold sterile normal saline. The incubation period after such inoculation is usually 10–16 days. Failures sometimes occur because : (1) the parasites may have died in transit ; (2) they may have been killed by antiseptics ; or (3) if the patient has had malaria before, he may be immune.

When several patients are to be treated and one has been successfully infected, the latter may be used as the source of infection. If the donor is in the same ward as the others, 5 ml. of venous blood are withdrawn and immediately injected into the recipient. If there is to be a time interval, however, between withdrawing from the donor and injecting into the recipient, heparinization or other means should be used to prevent clotting.

It is stated that it is often supposed that during certain periods of an attack of malaria the peripheral blood is free from parasites, and that subinoculation can therefore only be successful at certain times. Though this is true for *P. falciparum*, which completes its asexual cycle in the internal organs, it is not so for *P. vivax*, whose complete cycle takes place in the peripheral circulation. It is, however, advisable to take blood for subinoculation a few hours after the termination of a febrile episode because at this time the young parasites are securely attached to fresh erythrocytes, and the patient is usually feeling fairly comfortable. Blood should always be taken when young forms of the parasite are present if it is to be kept for a day or two, and it should be stored on ice.

There follows a description of the pyrexia in primary *P. vivax* malaria, of the management of induced malaria and a note concerning the preparation and staining of blood films. *A. W. Woodruff*

Falcone, G. Complicazioni oculari nella malaria. [**Eye Complications of Malaria**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1952, May, v. 33, No. 5, 287–99. [10 refs.] English summary (8 lines).

The author quotes the 3 conditions which Elliot has postulated for accepting [eye] disease manifestations to be due to malaria, namely, (i) periodic recurrence, (ii) the therapeutic test of specific anti-malaria drugs, and (iii) the demonstration of *Plasmodium* in the patient's blood. Falcone here describes 3 cases of serious uveitis which he found to satisfy conditions (ii) and (iii) above but not condition (i). He thinks that in his 3 cases the eye condition was an allergic manifestation of the uveal tract, after the latter had been sensitized by the products of destruction of the malarial parasite. *J. Cauchi*

Jaswant Singh, Ray, A. P., Basu, P. C. & Nair, C. P. **Comparative Studies on Chloroquine and Resochin against Simian and Human Malaria.** *Indian J. Malariology.* 1951, Dec., v. 5, No. 4, 547–57. [25 refs.]

Resochin (chloroquine, aralen), a 4-aminoquinoline derivative, first synthesized in Germany and later in America [this *Bulletin*, 1946, v. 43, 708 ;

1949, v. 46, 702], and sontochin (the 3-methyl derivative of resochin), with a similar history, have been widely tested on the different forms of human malaria, and chloroquine has also been tested against monkey malaria [*ibid.*, 1950, v. 47, 1181]. The relative activities of the two substances have now been compared in the 3 common forms of human malaria and in blood-induced infections of *P. knowlesi* in rhesus monkeys. The latter were treated orally with a single dose of drug soon after appearance of parasites in the peripheral blood. Six dosage schedules of 2·5 up to 80 mgm. per kgm. body weight were used on pairs of animals. In all cases the peripheral blood was freed from parasites within 42–120 hours. Death occurred in one animal receiving the highest dose of each drug. The surviving animals appeared to be sterilized except the two receiving the lowest dose of resochin.

Field trials and hospital studies were made on a total of 104 human patients suffering from one of the 3 common forms of infection and on 2 with mixed infections. The total adult dose for each was 1·5 gm. of the base of which 0·6 gm. was given on the first day and 0·3 gm. on three subsequent days. Blood clearance of asexual parasites was effected in 90 to 100 per cent. of cases within 48 hours, and clinical symptoms had abated. As in monkey malaria chloroquine was slightly more effective. Both drugs had about equal toxicity. In 40 cases observed over a period of 2 to 3 months, no relapses occurred. *J. D. Fulton*

Jones, S. A. **Malaria treated with Daraprim, including Cerebral Malaria and High Parasitaemia.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Sept., v. 46, No. 5, 564–9.

This paper records the use of Daraprim by mouth in 25 cases of malaria in Africans, including 3 cases with cerebral involvement. In all cases except one a single dose of 50 mgm. was given. Rapid " clinical and parasitological cure " followed though gametocyte production was not prevented. It was considered that the gametocytes were not capable of infecting mosquitoes. The occurrence of 2 cases of *P. ovale* infection in 25 was remarkable for East Africa. In 2 African patients with cerebral malaria who were admitted in a semi-conscious state one dose of 50 mgm. of Daraprim by mouth produced clinical improvement within 6 hours. No further treatment was given to them. To a third semi-conscious patient an initial oral dose of 75 mgm. of Daraprim was followed by marked clinical improvement within 6 hours. On the following day the patient relapsed into semi-consciousness and a further dose of 25 mgm. was given by mouth. On the third day rings were not found in the blood slide but the patient remained aphasic.

[In the 3 cerebral cases the patients were partially immune and were not completely comatose. One of them suffered a dangerous relapse on the second day. It is hoped that experiments on the oral administration of Daraprim in cerebral malaria in non-immunes or in unconscious Africans will not be contemplated.] *G. R. McRobert*

Robertson, G. I., Davey, D. G. & Fairley, N. H. **Cross-Resistance between " Daraprim " and Proguanil.** [Correspondence.] *Brit. Med. J.* 1952, Dec. 6, 1255–6.

The authors, using a proguanil-resistant strain of *Plasmodium gallinaceum*, were unable to confirm the results reported by Rollo [this *Bulletin*, 1951, v. 48, 1086] to the effect that strains of *P. gallinaceum* and *P. berghei* made resistant to proguanil could be successfully treated with pyrimethamine (Daraprim). In this letter they summarize the results of experiments carried out in Nairobi, Kenya, with a proguanil-resistant strain of *P. falciparum* obtained from Malaya.

(i) Four European volunteers were infected by mosquito bite and were each given 25 mgm. pyrimethamine at the time of biting and again one week later. All developed overt malaria within 12 days, and subinoculation on the 7th day resulted in a malarial attack in each of the recipients.

(ii) Two African volunteers, each given 25 mgm. pyrimethamine 72 hours after being bitten by infected mosquitoes, and a third, given 100 mgm. also at 72 hours, all developed malaria within the normal incubation period, thus demonstrating complete failure of causal prophylaxis. In similar experiments with an African strain of *P. falciparum* pyrimethamine was entirely successful in preventing the development of parasites.

(iii) Two European volunteers infected with the proguanil-resistant strain showed no clinical response when treated with pyrimethamine (50 mgm. daily). Parasites continued to increase in number, so that it became necessary to substitute chloroquine to terminate the attack.

(iv) African volunteers given 50 mgm. pyrimethamine once daily for 3 days or twice daily for 3 days continued to show parasites in the peripheral blood in undiminished numbers for 4 to 6 days after treatment was discontinued.

The cross-resistance of this strain of *P. falciparum* to pyrimethamine was thus clearly demonstrated. *G. Covell*

Lacroix, M., Mazzuca, M. & Bonnet, M. Chloriguane et prophylaxie antimalarique dans deux villages de Kabylie. [**Proguanil and Malaria Prophylaxis in Two Algerian Villages**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 4, 460–64.

The children in 2 Algerian villages situated at an elevation of about 1,000 metres were given a dose of proguanil on one day of each week from July 11 to October 31, 1951, each receiving 15 doses. Children of 0 to 5 years of age received 100 mgm. per week, those from 5 to 10 years 200 mgm. and those from 10 to 15 years 300 mgm. No anti-malarial drug was given to the adults.

The combined spleen rate for the two villages fell from 41 per cent. in July to 22 per cent. at the end of October. In 2 other villages where no anti-malarial drug was given the rate rose from 42 to 48 per cent. during the same period.

The authors note that these figures may logically be interpreted as showing the efficacy of proguanil for the treatment of chronic malaria. Clinical manifestations of malaria are, however, rare in Algeria, and the object of this study was not to prevent relapses in subjects already infected, but to render the transmission of the disease impossible by arresting the development of the parasite in the mosquito. On this point their observations were inconclusive.

Referring to the problem of the possible production of proguanil-resistant strains of parasite, the authors consider that though this may be a danger in regions of high permanent malarial endemicity, it is not likely to occur in a country like Algeria, where the endemicity is semi-permanent and seasonal, and where the administration of the drug would be limited to a 6-month period.

It is concluded that proguanil is the most effective prophylactic agent for Algeria and for other countries where malarial conditions are similar, by reason of its action on the parasite in the insect host. *G. Covell*

Gilroy, A. B. **Proguanil-Resistant** *Plasmodium falciparum* **in Assam.** *Ann. Trop. Med. & Parasit.* 1952, Sept., v. 46, No. 2, 121–6.

Adjacent to the Miker Hills of Central Assam 4 groups of children, all resident within a diameter of five miles and subjected to an approximately equal malaria risk, were studied in relation to prophylactic proguanil exhibited during the malaria transmission seasons, between April and November, 1947–1951.

From 1947 to 1949 the dosage was a bi-weekly one of 100 mgm. for those over 10 years of age, 50 mgm. for 2 to 10 years and 25 mgm. for those under 2 years. In 1950 the régime was altered to correspond with an adult dose of 300 mgm. weekly.

Samples of about 50 children were examined in each group ; 3 groups were from tea estates and the fourth, from a neighbouring village, was used as a control, *i.e.*, untreated with prophylactic drug.

Group 1 was exposed to *Anopheles minimus* and *A. leucosphyrus* and during 1950 there was such little apparent effect produced by proguanil on spleen and parasite rates that it was not given in 1951. In April 1950 the spleen rate was 58 per cent., in November 61 per cent., in March 1951 68 per cent. and in November 53 per cent. The parasite rate increased from 42 to 72 per cent. during 1950 and remained at this level during 1951. In all children (95) at risk there were 71 cases of clinical malaria in 1950 and 82 in 1951.

Group 2 lived about 5 miles from group 1 and had received proguanil for 4 consecutive malaria seasons, including 1951. In June and November 1951 the spleen rates were 34 and 32 per cent. and parasite rates 47 and 55 per cent. respectively. Of 55 children at risk 19 developed clinical malaria.

Group 3 lived only a few hundred yards from group 2 and had received proguanil for similar periods. In June 1951 the spleen rate was similar at 35 per cent. but the parasite rate was on a higher level at 62 per cent. At the end of June chloroquine replaced proguanil at comparable dosage and after 4 months the spleen and parasite rates fell in November to 2 and 6 per cent. respectively. During this chloroquine period 8 out of 48 children developed clinical malaria.

Group 4 consisted of children subjected to a heavy seasonal malaria risk but without any form of chemoprophylaxis ; in December 1951, the spleen and parasite rates were 59 and 66 per cent. ; 27 of the 41 children examined showed malaria parasites and the parasite was *Plasmodium falciparum*, only one child exhibiting *P. vivax* in a double infection.

The following points appear to favour proguanil resistance on the part of *P. falciparum* as a major factor in the interpretation of these results :—

1. The very high level reached by the parasite rate in groups 1 and 2 during continuous proguanil administration.
2. The rapid reduction effected in the rates in group 3 when chloroquine was substituted for proguanil.
3. The number of attacks of malaria, especially in group 1 in 1950, indicating that proguanil was not effective even as a suppressive of the asexual erythrocytic stages.

R. Ford Tredre

Richou, M. Les techniques modernes dans la lutte contre le paludisme. [**Modern Methods in Malaria Control**] *Rev. Coloniale de Méd. et Chir.* 1952, Nov. 15, v. 24, No. 207, 198–204, 1 fig.

It should not be assumed that imagocidal work has totally replaced larvicidal work in the control of malaria, as there are circumstances where the latter remains preferable. Application of larvicide by aircraft, and particularly helicopters, may have great advantages over land work in that complete and rapid coverage can be attained despite inaccessibility of breeding places from the ground, and air application produces the double effect of destruction of all larvae and all adults in the open. Both fixed-wing aircraft and helicopters were used in Algeria in 1951. In all, 2,000 hectares (5,000 acres) of breeding places were treated 6 times, distributing either a 21 per cent. solution of DDT in gas oil with an emulsifier, or a powdered preparation. The former was used on open water and the latter where there was much vegetation and on the edges of swamps and rivers. The anophelines attacked were *Anopheles maculipennis*,

A. claviger, *A. algeriensis* and *A. hispaniola*. The quantities of larvicide used were much smaller than those used by land workers for equivalent areas ; approximately 1·75 gallons per acre to be compared with 3 or 4 times that amount. The cost of treatment using either type of aircraft was approximately Fr. 2,500 per hectare, the cost of ground application being Fr. 6,400. Helicopters showed great advantages over fixed-wing aircraft. Latterly DDT smokes were used and promise great diminution in the quantity of insecticide used and consequent longer traverses by the aircraft with corresponding reduction in costs. The establishment of an organization to undertake control by such means is advised. *G. Macdonald*

Jadin, J., Fain, A. & Rupp, H. Lutte anti-malarienne étendue en zone rurale au moyen de D.D.T. à Astrida, Ruanda-Urundi. [**Extensive Malaria Control with DDT in a Rural Area at Astrida, Ruanda-Urundi**] *Inst. Roy. Colonial Belge. Sect. des Sci. Naturelles et Méd. Mémoires.* (Collection in-8°.) 1952, v. 21, No. 1, 47 pp., 2 graphs & 8 figs. (7 on 3 pls.)

This memorandum describes in considerable detail the residual DDT campaign for malaria control in an area in Ruanda-Urundi ; it was well populated with an average of 1,030 to 1,300 people per square mile. The terrain is typically Central African with a hilly and plateau type of country interspersed with swampy valleys ; the altitude averages 5,500 ft. Dwellings are usually situated on hill crests.

The principal anopheles present are *Anopheles funestus* and *A. christyi*, the former being the chief vector of malaria ; *A. gambiae* is rare. The sporozoite index is 6–18 per cent. for *A. funestus*.

Culicines constitute the principal biting nuisance to the inhabitants. The residual insecticide method is most ineffective against the culicines because they do not rest on walls of huts after feeding ; only larval measures are, in consequence, used for control.

In the first place, trials of formulations of DDT were instituted with the use of 50 per cent. wettable powder applied in the usual way as a suspension, at a dosage of 200 mgm. per sq. ft. and 10 per cent. DDT applied as a dust to the internal surfaces of dwellings. In comparison with controls there was very marked reduction of anopheline population following both methods of application. Both dust and suspension also produced a very marked decrease in the parasite rate of the occupants. As a result of these trials, large-scale insecticide measures ensued with the use of 50 per cent. wettable powder in suspension and applied by a pressure sprayer. The preparation of the suspension was undertaken locally at the dwellings to be treated, water being provided by the householders ; the wettable powder had been weighed at a central point into 200 gm. packets for subsequent suspension in 10 litres of water.

A circular area round Astrida, diameter 25 km., which included 22,446 huts with a population of 37,736 people, was so treated, involving the use of 1,443 kgm. of wettable powder.

The second programme was instituted 6 months later in another overlapping district in which 33,220 huts with a population of 50,295 were treated with either 50 per cent. wettable powder or a 25 per cent. emulsion DDT.

In the dry season, swamps in relation to the concentrations of huts were treated with a larvicide containing 5 per cent. to 10 per cent. DDT applied by dust-gun.

The results of these control programmes are quoted in detail in tabular form and can be summarized thus :—Anopheline vectors of malaria in the mountainous region of Astrida disappeared after the treatment of African

huts with 50 per cent. DDT ; the plasmodium index dropped from 51·13 to 24·06 *i.e.*, a percentage decrease of 52·92. These observations were based on the examination of 23,028 thick blood films. *R. Ford Tredre*

DAVIDSON, G. **Experiments on the Use of DDT, BHC and Dieldrin against, Adult Mosquitoes at Taveta, Kenya.** *Nature.* 1952, Oct. 25, v. 170, 702–3.

The effects of various formulations of DDT, BHC and dieldrin on adult *Anopheles gambiae, A. funestus* and culicine mosquitoes are recorded. In the African huts before the commencement of the use of residual insecticides it was found that most of the female *A. gambiae* and *A. funestus*, which entered during the night to feed on the occupants, rested inside the huts after feeding until their blood was digested and their ovaries matured. The gravid mosquitoes then left the hut in the evening. Except during the season of peak production of these species, more mosquitoes left the huts in the evening than during the rest of the night. Nearly all those leaving during the rest of the night and early morning were unfed individuals ; very few were fed and showing ovarian development.

In the first series of experiments it was shown that Ditrene (98 mgm. DDT per sq. ft.) caused an anopheline mortality of 40 and 20 per cent. in the first and second months after the single treatment ; with Gammexane P.530 (20 mgm. of gamma isomer BHC per sq. ft.) the mortalities were 99, 95 and 60 per cent. respectively during the first 3 months. Other formulations of DDT and BHC confirmed these results.

A significant proportion, always more than 20 per cent., of female anophelines entering huts treated with DDT escaped unharmed even immediately after treatment. But for 6 months after treatment, mortalities remained between 50 and 70 per cent. and even at 40 to 60 per cent. during the succeeding 7th to 9th months. The proportion of these found dead within the huts was relatively small, the majority of deaths occurring in those caught in the window traps, an obvious indication of the marked irritant qualities of DDT. Higher kills were obtained with formulations of DDT of small crystal size, which probably accounts for the above-mentioned poor kills with Ditrene, which had a comparatively high average crystal size of 80 microns.

In the first month after treatment no female anopheline escaped death in the huts treated with BHC, either in the form of wettable powder, Gammexane P.520, or oil-bound suspension, Supona B, at approximately 20 mgm. gamma isomer per sq. ft. There was a progressive fall in mortality to 70 per cent. at the 3rd month and to as low as 30 per cent. at the 6th month. Greater numbers of anophelines were found dead in the huts than succumbed in the window traps.

A mixture of DDT and *gamma* BHC (223 and 7 mgm. per sq. ft. respectively) produced the combined effect of high initial and lasting kill with the irritant influence of DDT also evident.

Dieldrin wettable powder at a calculated dose of 50 mgm. per sq. ft. produced 100 per cent. mortality in anophelines for 3 months and exceeded 80 per cent. in the following 6 months ; the majority of mosquitoes died inside the hut.

Against *Culex fatigans* DDT gave low kills, 10 to 30 per cent. ; BHC was initially high at 85 per cent., fading rapidly to low at 7 to 30 per cent. ; dieldrin gave high and long lasting kills, 60 to 95 per cent. for 7 months.

Experiments suggested that air-borne particles of the relatively non-volatile DDT and dieldrin contribute to the lethal effect on mosquitoes in these huts.

In a separate set of experiments a close study was made of the irritant effect on individual mosquitoes of surfaces treated with insecticides. *A. gambiae* and *A. funestus* were irritated sooner or later by all 3 insecticides and flew away.

It was clearly demonstrated that a high proportion of these mosquitoes were irritated by DDT and left before they had acquired a lethal dose. The longest contacts and highest kills occurred with dieldrin ; figures for BHC were slightly lower. *R. Ford Tredre*

DAVIDSON, G. & BURNETT, G. F. **Apparent Fumigant Action of Non-Volatile Insecticides in African Huts.** [Correspondence.] *Nature.* 1952, Nov. 22, v. 170, 893.

In the course of the above investigation, it was found that mosquitoes brought into sprayed rooms in cages might be killed by the insecticides without actually contacting the deposits on the walls or ceiling. In the case of *gamma* BHC, this action at a distance could be explained by a fumigant effect ; but the phenomenon was also observed with DDT and with dieldrin. It seemed possible that this action of these two non-volatile compounds might be due to minute air-borne particles ; and this paper describes experiments which confirm this explanation.

Twenty to forty female *A. gambiae* and *A. funestus* were used in each test. They were exposed in 1 lb. glass jars, fitted with waxed bungs with inlet and outlet tubes, the latter connected to a filter pump which allowed air to be drawn from a treated room, through the jar at the rate of 90 litres per hour, for 40 minutes. Four trials were done in a hut treated 5 weeks before with dieldrin, at the rate of 40 mgm. per sq. ft. In two tests the air sample was drawn from near the wall, and in two from near the ceiling. In each of these positions one trial was done with a Whatman No. 1 filter paper over the inlet funnel to exclude air-borne particles.

The mortalities 18 hours later were :—

Filtered air	(near wall)	21 per cent.
,,	,, (near roof)	7 ,, ,,
Unfiltered ,,	(near wall)	55 ,, ,,
,,	,, (near roof)	100 ,, ,,
Control		15 ,, ,,

It seems, then, very probable that air-borne particles may play an important part in the insecticidal activity of rooms treated with non-volatile insecticides. *J. R. Busvine*

PAKISTAN J. OF HEALTH. 1952, July, v. 2, No. 2, 61–91, 10 figs. **Final Comprehensive Report Pakistan, E. Bengal Malaria Control Demonstration Team, Mymensingh District by United Nations WHO Regional Office, Eastern Mediterranean.**

Malaria in East Bengal is carried by *Anopheles philippinensis*, the prevalence of which increases greatly in April to July and again briefly from October to mid-November. Normal sporozoite rates are low. The transmission season coincides with that of maximum anopheline prevalence, and normal spleen rates are high in adults (48 per cent.) and children (70 per cent.) while parasite rates are lower (10 per cent. and 24 per cent.).

A joint WHO/UNICEF demonstration team has operated in the area from May 1949 onwards. It made a survey and epidemiological and entomological observations. Malaria control by residual DDT as an imagocide has been carried out in a densely populated rural area with a population of 13,000. DDT was applied mainly as a suspension at a dose of approximately 200 mgm. per square foot once in each year, the area of control being extended annually. The cost of application, including overhead expenses, averaged rupees –/8/9—

(approximately 10d.) per person protected per year. Malariometric observations continued in treated and untreated areas ; parasite and spleen rates showed satisfactory but slow reductions in treated areas, the infant parasite rate in treated areas became low and most positive cases found were recent immigrants. The gametocyte rate dropped more rapidly than the parasite rate.

Entomological findings are recorded.

Recommendations include an annual distribution of 150 mgm. DDT per square foot with a possible reduction to 100 mgm. per square foot only if an adequate check can be kept.

Agricultural statistics suggest materially increased output in the treated area, but this is reported with caution.

Kala azar is present and appears to have been controlled. Other activities included public health nursing, sanitation and training. *G. Macdonald*

TRAPIDO, H. **Modified Response of *Anopheles albimanus* to DDT Residual House Spraying in Panama.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 853–61.

In co-operation with the former Tropical Disease Control Branch of the Office of the Surgeon General, U.S. Army, and the former Office of Scientific Research and Development, the Gorgas Memorial Laboratory staff initiated experiments with DDT as a residual house treatment for the control of malaria in 1944.

The area chosen for these experiments was a group of villages on the middle Chagres River in Panama, where *Anopheles albimanus* is the malaria vector. During the first 15 months mosquito capture records indicated a large reduction in mosquito numbers (70 to 99 per cent.), a marked reduction in the percentage engorged with blood, a high 24-hour mortality rate in those engorged mosquitoes and lastly, that unengorged anophelines survived for 24 hours in the same proportion as such mosquitoes in untreated houses.

After each DDT treatment the mortality was such that the general village mosquito population was heavily reduced, as shown by stable traps. There seemed to be a selective action on the engorged mosquitoes which may have acquired malarial infection. A dramatic drop in the incidence of malaria occurred to the point that only an occasional positive case was found and these proved subsequently to have been acquired elsewhere [this *Bulletin*, 1947, v. 44, 287].

Routine mosquito capture records in houses ceased in 1946 but regular DDT spraying was continued at 4-month intervals. Throughout the period 1944–52 malaria continued to be absent among the population of the villages submitted to residual insecticide treatment. Early in 1952 it was decided to recommence mosquito captures in a manner similar to that previously used to determine if any change had occurred in the reaction of *A. albimanus* to exposure to insecticide. Comparison is made in this paper of the weekly mosquito capture records for January–April, 1952, with the same months of 1945 and 1946, *i.e.*, just after the initial DDT spraying. The author had satisfied himself that climatic conditions and other factors did not mitigate against such comparison of data. In one of these villages which had received 20 DDT treatments in 86 months the average weekly numbers of *A. albimanus* per house per night were 4·6, 1·4, and 21·7, respectively for 1945, 1946, and 1952. In another village where DDT spraying had been in use for the five years 1948–52 comparable figures were 37·3, 25·9, and 34·6 respectively ; the 1945–46 figures were for *A. albimanus* populations unaffected by DDT.

In 1944 it was observed that the use of DDT made mosquitoes restless and discouraged them from feeding. The percentage of captured anophelines

which were engorged in 1944–45 was 7·1 compared with 47·4 in untreated controls ; the comparable figure for 1952 is 7·6. In the village treated with DDT for 1947–52 the comparable figure in 1952 is 4·5 compared with 42·1 in 1945 when the village was untreated. It appears therefore that DDT continues to be effective in maintaining a marked reduction in the proportion of *A. albimanus* which *feed* in dwellings.

Whereas in 1945 only 4·2 per cent. of engorged mosquitoes survived 24 hours in DDT-treated dwellings, in 1952 this proportion had risen to 35·2 per cent., which was comparable to the 30·7 per cent. of survivals of unengorged anophelines. It is obvious therefore that selective killing of engorged *A. albimanus* in DDT-treated houses no longer occurs.

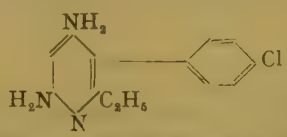
No rise in malaria rates has occurred in these villages. This modification in the response of *A. albimanus* to DDT requires further investigation by laboratory experiments. *R. Ford Tredre*

Jaswant Singh, Ray, A. P. & Ramakrishnan, S. P. **Effect of Proguanil on Sporogony Cycle of *P. knowlesi*. Part I.** *Indian J. Malariology.* 1951, Dec., v. 5, No. 4, 541–6. [23 refs.]

Earlier work had shown that sporozoites of *P. falciparum* failed to develop normally in mosquitoes fed on a patient treated with proguanil [paludrine] [this *Bulletin*, 1948, v. 45, 305]. The work reported here deals with the effect which a single dose of this drug, administered to the rhesus host of *P. knowlesi*, had on the sporogony cycle in *Anopheles annularis* which had been found to act as a vector of this parasite. Thirty mosquitoes were fed on an infected monkey, showing gametocytes in the peripheral blood, for 2 days prior to drug treatment in dosage of 20 mgm. which corresponds to double the dose of 300 mgm., the maximum given to human patients. After this dose 15 mosquitoes were fed at intervals of 4, 8 and 12 hours. Other batches of mosquitoes continued to be fed for 12 days. From the 4th day after the infective feed some mosquitoes from each batch were dissected. It was found that infection was present in those fed prior to drug treatment, the gland rate being approximately 20 per cent. Mosquitoes fed within 4 hours after drug treatment showed scanty or no infection and in those fed during the next 5 days the infection rate was zero, in either glands or gut. From the 6th day onwards, however, infections were regularly found. It should be noted that the gametocyte counts in blood fell continuously from the start of treatment. The question of drug suppressive treatment with proguanil in an endemic area from the point of view of these and other results is discussed. *J. D. Fulton*

Jaswant Singh, Misra, B. G., Ray, A. P., Basu, P. C. & Bami, H. L. **Daraprim (50–63) in Simian Malaria.** *Indian J. Malariology.* 1951, Dec., v. 5, No. 4, 531–40, 1 chart. [23 refs.]

Marked activity of several 2 : 4-diaminopyrimidines against *P. gallinaceum* and *P. berghei* was reported by Falco *et al.* [this *Bulletin*, 1951, v. 48, 872] and among them the substance known as Daraprim



(2 : 4-diamino-*p*-chlorophenyl-6-ethyl pyrimidine) was outstanding. Subsequent publications [Archibald, *ibid.*, 1952, v. 49, 11 ; Goodwin, *ibid.*, 664 ;

McGregor and Smith, *ibid.*, 663] have indicated its activity in human malarial infections. The present investigation deals with the action of Daraprim in blood-induced infections of *P. knowlesi* in 66 rhesus monkeys, and the results of acute and chronic toxicity tests are also recorded. The drugs were given by mouth daily for 7 days during therapeutic trials in a dosage schedule based on mgm. of drug base per kgm. of body weight, starting when 0·1 to 0·2 per cent. of the host red cells were infected. The minimum effective dose (MED), the dose which causes disappearance of the parasites on the 8th day from the start of treatment, was found to be 0·005 mgm./kgm. Sterilization of the peripheral blood was sometimes effected with a dose of 5 mgm. per kgm. but relapses also occurred with double this amount. Against asexual forms the drug acted slowly, blood clearance being effected in 80 to 110 hours and up to 160 hours or longer was required to clear gametocytes. In either case the speed of clearance was not proportional to the dose of drug. Experiments on acute toxicity following a single dose of drug indicated that the values for LD0, LD50, and LD100 were approximately 40, 55, and 150 mgm. per kgm. respectively, and symptoms appeared in 1 to 36 hours after the start of treatment in fatal cases. These symptoms included salivation, retching, vomiting, convulsions, and paralysis followed by death. Degenerative changes in kidneys and liver were observed as a result of drug treatment. It was found that a proguanil-resistant strain of *P. knowlesi* was also resistant to Daraprim.

[This strain of *P. knowlesi* was one which had been passaged by blood inoculation in the laboratory for about 20 years. In untreated infections only 20 to 30 per cent. of the host red cells became infected and mortality rates were low. It cannot therefore be regarded as a typical infection.]

J. D. Fulton

Jaswant Singh, Ramakrishnan, S. P., Satya Prakash, Krishnaswami, A. K., Ray, A. P., Krishnan, K. S. & David, A. **A Fungus (Chytridinae sp. ?) resembling Plasmodial Sporozoites in the Salivary Glands of *A. annularis* van der Wulp, 1884.** *Indian J. Malariology.* 1951, Dec., v. 5, No. 4, 527–30, 2 pls.

Laboratory bred *Anopheles annularis* were fed on animals (mice, rats and squirrels) infected with *Plasmodium berghei* when gametocytes were present in the blood. Salivary glands and midguts of the mosquitoes were dissected 5 to 20 days later, but no malaria infection was detected. Instead, curious rod-shaped bodies, superficially resembling sporozoites, were found in the salivary glands of 14·5 per cent. of 1,832 specimens. The bodies were 6–10 μ in length, were non-motile and stained red with eosin. No oöcysts were present in any of the series and inoculation of suspensions of glands into animals was never followed by infection. Wild *A. annularis* also showed these bodies in the glands ; and laboratory-bred specimens, not fed on *P. berghei*-infected blood, were likewise positive, provided they had been kept for several days after emergence. Six other species of mosquitoes did not exhibit the infection.

Dr. H. N. Ray examined preparations and concluded that the bodies were fungal in nature, probably a species of Chytridinae ; and, late in the season, large clumps of mycelium were found in the gut of a few specimens of *A. annularis.*

P. C. C. Garnham

Fabiani, G., Grellet, P., Vargues, R., Fulchiron, G. & Verain, A. La parasitémie au cours de l'infection expérimentale du rat blanc par *Plasmodium berghei.* Étude quantitative et qualitative. [**Quantitative and Qualitative Study of the Parasitaemia in Experimental Infection of the White Rat with** *P. berghei*] *Ann. Inst. Pasteur.* 1952, June, v. 82, No. 6, 721–37, 3 figs.

TRAGER, W. **Studies on the Extracellular Cultivation of an Intracellular Parasite (Avian Malaria). II. The Effects of Malate and of Coenzyme A Concentrates.** *J. Exper. Med.* 1952, Nov. 1, v. 96, No. 5, 465–76, 3 figs. on pl. [10 refs.]

The author [this *Bulletin*, 1951, v. 48, 130] had successfully cultivated *P. lophurae in vitro* for short periods in absence of the host red cell by use of a medium which had among its other constituents an extract of duck red cells. When the medium was supplemented by adenosinetriphosphate and sodium pyruvate better results were obtained. The addition of potassium malate [see CLARKE, below, 1953, p. 196] and concentrates of coenzyme A have now been shown to increase the life span of these extracellular parasites. Duck cells infected with early stages of *P. lophurae* were obtained and freed from the host cell by haemolytic serum as in earlier experiments and the preparation of the supplements to add to the original medium are now described. The culture vessels were 50 ml. Erlenmeyer flasks with gas inlets and contained 3·0 ml. of duck erythrocyte extract with supplements in a further volume of 0·2 to 0·4 ml. to which was also added 0·3 ml. lysed blood with parasites freed from host cell. Incubation was carried out at 39° to 40°C. in a current of 5 per cent. CO_2 in air. Changes of culture medium were made after the first 18 hours and thereafter at 12-hour intervals. Details of this procedure should be consulted in the original. The morphological criteria used to assess survival and development of parasites by means of stained films have been given previously. Phase contrast microscopy has also been used in the study of fresh preparations. It was concluded from the results obtained that extracellular *P. lophurae* requires *l*-malic acid and probably coenzyme A for maintenance, in addition to other factors known and unknown. In the duck erythrocyte medium supplemented with these two substances, along with adenosinetriphosphate, sodium pyruvate and related substances "only 5 to 10 per cent of the extracellular parasites had become abnormal after 3 days of cultivation". *J. D. Fulton*

CLARKE, Delphine H. **The Use of Phosphorus 32 in Studies on *Plasmodium gallinaceum*. I. The Development of a Method for the Quantitative Determination of Parasite Growth and Development** *in Vitro*. *J. Exper. Med.* 1952, Nov. 1, v. 96, No. 5, 439–50, 4 figs. on pl. [19 refs.]

Radio-active phosphorus has been used to follow the growth of *P. gallinaceum in vitro*, by studying its incorporation into desoxypentosenucleic acid of growing cells, a method which has been accepted as an index of the synthetic processes in these circumstances. The method suffers, however, from the drawback in the case of plasmodia that the parasite is intracellular and dependent on the metabolism of its nucleated host cell, but this fact has been taken into consideration by the author.

The phosphorus isotope used was P^{32} incorporated into Na_2HPO_4 or NaH_2PO_4. For *in vitro* experiments the activity was 0·001 to 0·08 microcuries per ml. of medium. The *in vivo* dose used was 1 to 2 microcuries given intravenously per 100 gm. body weight, to normal and parasitized chickens 22 hours before collection of cells. The parasite was maintained in chickens by blood inoculation and mosquito passage so that the infection was as synchronous as possible. The samples of blood used were freed as far as possible from leucocytes. The infected and non-infected red cells, generally 0·5 to 1·0 ml. in volume, were mixed with medium which consisted mainly of chicken red cell extracts prepared as described [this *Bulletin*, 1951, v. 48, 130]. Incubation was carried out for 22 hours in flasks at 40°C. in an atmosphere of CO_2–air. To remove

all contaminating radio-activity from the cells whose own radio-activity was to be measured, they were centrifuged down and washed 3 to 5 times in a protein-containing medium to avoid damage to the cells during the process. The cells were then homogenized, and recognized procedures were used for estimation of acid-soluble phosphates, phospholipids, desoxypentosenucleic acids (DNA) and pentosenucleic acids (PNA). After conversion of the phosphorus in these fractions to orthophosphate, non-radio-active inorganic carrier phosphorus was added before final precipitation to ensure completeness and uniformity in the procedures prior to determination of radio-activity with the aid of a Geiger-Müller tube. The amount of radio-active phosphorus incorporated into nucleic acids could then be calculated.

It was found that whereas most of the radio-activity of normal cells was present in the acid-soluble portion, that of infected cells occurred chiefly in the phospholipid and nucleic acid fractions. It was noteworthy that the *in vivo* and *in vitro* results were comparable in this respect, and suggested that the latter conditions were satisfactory for the cell metabolic processes. Experimental evidence was also obtained that the presence of P^{32} did not itself give rise to any abnormal effects in parasite or cellular activity.

A special study was made of the incorporation of phosphorus into PNA and DNA of normal and parasitized cells. It was found that the DNA of the normal cell did not incorporate any of the radio-active element and that this process was confined to the parasitized cell system. With support from further experimental work, it was therefore concluded that this incorporation is a measure of parasite development and growth. Because the metabolism of the parasitized host cell may be profoundly changed by the presence of the plasmodium, experiments with parasites freed from red cells were also carried out and supported the above conclusions with regard to incorporation of radio-active phosphorus in the parasite DNA. The methods employed, checked at the same time by examination of stained films, are believed to provide a sensitive quantitative method for measuring parasite growth, which would be impossible by other means. *J. D. Fulton*

CLARKE, Delphine H. **The Use of Phosphorus 32 in Studies on *Plasmodium gallinaceum*. II. Studies on Conditions affecting Parasite Growth in Intact Cells and in Lysates.** *J. Exper. Med.* 1952, Nov. 1, v. 96, No. 5, 451–63. [16 refs.]

The method described above for the study of parasite growth, in which the amount of P^{32} incorporated into the desoxypentose nucleic acids of *P. gallinaceum in vitro* and *in vivo* was determined, has now been used to find out how parasite growth varies under different conditions. Previous work on the requirements for growth of plasmodia *in vitro* has been used as a basis for these experiments [this *Bulletin*, 1942, v. 39, 440 ; 1943, v. 40, 675 ; 1947, v. 44, 1043, 1046 ; 1950, v. 47, 1067]. The present investigation was simplified in so far as single generations of parasites were studied over a period of 18 to 22 hours only. Infected red cells were obtained by centrifugation of chicken blood in presence of heparin and when required were lysed by specific rabbit anti-chicken-red-cell serum in presence of complement at 40°C. during a period of 30 min. while being rotated [*ibid.*, 1946, v. 43, 1116] and on centrifugation the parasites and red cell remains were collected and added to the different media employed containing P^{32}. For a detailed description of these media the reader should consult the original. Anaerobic conditions when required were obtained in the incubation flasks by flushing with a CO_2–N_2 mixture.

In studying intact cells a comparison was first made of a synthetic medium and that containing red cell extract. Of the two the latter was much more

favourable for growth and its properties were enhanced by addition of chicken serum heated for 1 hour at 56°C. Attempts to fractionate the erythrocyte extract for its growth-promoting factors by dialysis showed that the chief beneficial effect was exerted by the non-dialysable portion. To avoid the complication of the presence of the host red cell, further experiments were carried out with intact parasites obtained by the use of anti-red-cell serum. At first the lysates of *P. gallinaceum* failed to exhibit any growth but later conditions were found which enabled comparative studies on these lysates and on intact parasitized red cells to be made by means of the DNA or total nucleic acids present incorporating P^{32}. It was concluded that the chief constituents of value in the medium were fresh concentrated erythrocyte extract with addition of malate, and for satisfactory conditions the parasite population had to be limited. Since succinate could not replace malate, it would seem that the effect of the latter was not brought about by taking part in the citric acid cycle. The heated normal chicken serum added to erythrocyte extract had not the same favourable effect on parasites freed from host cell as it had in the case of intact parasitized cells. The comparable experiments on parasitized intact red cells and on lysates showed that experimental conditions affected each preparation in different ways, and that quinine was relatively ineffective in absence of the host red cell. The implications of these results are discussed.

J. D. Fulton

LEWERT, R. M. **Nucleic Acids in Plasmodia and the Phosphorus Partition of Cells infected with** *Plasmodium gallinaceum*. *J. Infect. Dis.* 1952, Sept.-Oct., v. 91, No. 2, 125–44, 107 figs. (67 coloured) on 4 pls. [Refs. in footnotes.]

The Feulgen staining method has been used in a few cases in studies on the presence and distribution of nucleic acid in plasmodia, but the distribution of ribonucleic acid does not appear to have been described. Chemical investigations on the total nucleic and other phosphorus fractions in plasmodia were made by BALL *et al.* [this *Bulletin*, 1949, v. 46, 117]. In the present investigations chemical and staining techniques have been used to show the presence of these acids in blood and exo-erythrocytic forms of *P. gallinaceum*, and in blood forms of *P. lophurae* and *P. vivax* as well as in sporozoites of the latter. Blood and tissue smears were fixed wet in absolute methyl alcohol, 95 per cent. ethyl alcohol, Zenker-formol solution or in a mixture of formol-alcohol-acetic-acid. Before staining, malarial pigment was removed by alkaline alcohol or by alcohol-chloroform mixture, and lipid was also extracted. The action of the enzymes ribonuclease and desoxyribonuclease on the fixed films was studied in conjunction with staining techniques, in which toluidine blue, Unna's methyl-green-pyronin, Feulgen's stain, Hotchkiss method for staining polysaccharides with alcoholic periodic acid and leucofuchsin, Gomori's alkaline phosphatase method and also Giemsa's stain, were used. Examination of fresh and fixed films was also made with a fluorescence microscope.

In the case of *P. gallinaceum* the partition of phosphorus into acid soluble lipid, phosphoprotein, desoxyribo- and ribonucleic acid fractions was carried out by standard methods. The brain of chicks infected with the exo-erythrocytic forms of *P. gallinaceum* was also separated into similar P fractions. Infected blood freed from leucocytes as far as possible for a similar fractionation was obtained at an early stage of infection, so as to avoid the presence of large numbers of reticulocytes. It was found that Feulgen staining was unaffected by previous treatment of smears with ribonuclease but that desoxyribonuclease removed all Feulgen-positive material. Some fixatives appeared to inactivate the enzymes. The nuclear staining of *P. gallinaceum* by the Feulgen

method presented a different appearance from that obtained by the Giemsa method. The intensity of the former stain varied with the age of the parasite. Gametocyte and sporozoite nuclei could not be readily identified when this method was used. The nuclei of blood forms of the two avian parasites studied stained more intensively than that of *P. vivax*, and it appeared that nuclear staining of the host cell was adversely affected when parasitized.

In regard to ribonucleic acid (RNA), the most notable feature in plasmodia was its presence in deeply stained metachromatic granules, juxtanuclear in position, which divided prior to nuclear division and appeared to act like nucleoli and were pyronin-positive but Feulgen-negative. By the use of acridine O, which is known to be bound by RNA, these dots can be made to fluoresce a brilliant green. With the phase contrast microscope they appeared as dark dots in all the plasmodia studied. Staining of these granules was prevented by previous treatment with ribonuclease which also gave rise to a perforated or notched appearance of the nucleus, no doubt due to removal of RNA. The impression was gained that there was a regular cycle in the formation of cytoplasmic RNA. Gametocytes and sporozoites as in the case of DNA stained poorly also for RNA. The large amount of the latter substance in the cytoplasm of plasmodia was also demonstrated by ultra-violet absorption. The experimental evidence also suggested that the distribution of alkaline phosphatase and RNA was similar in exo-erythrocytic forms of *P. gallinaceum* and a relationship to protein synthesis has been suggested. The results of separation of P fractions in the brain of a chick infected with *P. gallinaceum* show that there is little deviation from normal, contrary to what staining reactions would suggest. There was a significant decrease in total nucleic acid due to loss of RNA from host cell whereas lipid-P was increased. In the infected red cells of young chickens similarly fractionated large increases in total P above normal were noted, the greatest individual increases being for RNA and lipid-P. Owing to degradation of host DNA any increase in this substance was masked. There was also a small increase in acid-soluble P but protein-P remained unchanged. The magnitude of these changes appeared to be governed by the stage of infection as well as by its degree. When similar estimations were made on infected red cells from older birds the results varied somewhat, depending on the degree of P depletion in the host cell. *J. D. Fulton*

LEWERT, R. M. **Changes in Nucleic Acids and Protein in nucleated Erythrocytes infected with *Plasmodium gallinaceum* as shown by Ultraviolet Absorption Measurements.** *J. Infect. Dis.* 1952, Sept.-Oct., v. 91, No. 2, 180–83.

In the preceding paper the author has shown by staining methods and estimation of the various P fractions that ribonucleic acid is present in considerable quantities in the cytoplasm of plasmodia. The amount of nucleic acid in the host cell showed marked variations depending on the stage of development of the parasite and on the degree of parasitaemia and the host nucleus was markedly affected. The present investigation was undertaken to study these changes in nucleic acid and protein in host nucleus and cytoplasm of the parasite within individual cells by means of ultra-violet absorption measurements. Smears were made on quartz slides of the blood of chickens infected with *P. gallinaceum* at a stage of the infection when reticulocytes were scanty. The smears were allowed to dry in air, and were then immersed in an alcoholic lanthanum solution for 30 min. Prior to examination glycerin with a small amount of lanthanum nitrate was used as mounting medium and covered by a quartz coverslip. When infected erythrocytes from proguanil [chlorguanide]-treated birds were used the samples were obtained 30 hours after drug treatment. A quartz microscope was used for the absorption measurements at 265·2 and 280·4 mμ

at which maximum absorption of nucleotides and cyclic amino acids respectively occurs. It was arranged that a cylinder about 1μ in diameter through nucleus and cytoplasm of the host cell and through the parasite material should be examined. It was found as a result of these ultra-violet absorption measurements that the presence of a parasite in the avian host cell caused a loss of nucleic acid and protein constituents of the host nucleus. The amount of loss of nucleic acid in proguanil-treated hosts was very much less, whereas that of amino acids was affected only to a slight extent. As noted earlier the degree of loss was influenced by the intensity of parasitaemia and stage of development of the parasites. Smaller changes occurred in nucleotides and amino acids of the parasite cytoplasm than in the host nucleus. After proguanil treatment there was, however, a marked decrease of ribonucleic acid in the parasite cytoplasm and the synthesis of cytoplasmic protein was affected. These results are discussed with reference to the staining reactions carried out earlier in this connexion. *J. D. Fulton*

Eyles, D. E. **Studies on *Plasmodium gallinaceum*. II. Factors in the Blood of the Vertebrate Host influencing Mosquito Infection.** *Amer. J. Hyg.* 1952, Mar., v. 55, No. 2, 276–90, 3 figs. [16 refs.]

A strain of *Plasmodium gallinaceum* transmitted by *Aëdes aegypti* was used to determine some of the factors influencing the development of the malaria parasite in the mosquito. Although it was possible to remove parasites from their containing red blood corpuscles, it was necessary to include a few red blood corpuscles in any media presented as food to the mosquitoes through a membrane, otherwise they did not take the meal into the stomach. However, it could be shown that although some parasites developed when serum was replaced by physiological saline, development was best in the presence of serum. Work was then carried out on the function of different constituents of serum in promoting the growth of the parasite. Known dialysable constituents of serum were tested but gave no better results than when physiological saline alone was used for the suspension of the parasite and blood cells. An ultrafiltrate of chicken serum was equally unsatisfactory. However, dialysed serum promoted growth of the parasites and further work indicated that serum albumin is at least one important constituent of the serum as regards the growth and nutrition of the malaria parasite after its ingestion by the mosquito. It is supposed that in the experiments with dialysed serum the red blood cells, which were necessary to induce proper feeding by the mosquito, or the mosquito tissues themselves, or breakdown products of the dialysed serum in the mosquito, must supply such other constituents as may be necessary but are lost in the dialysable fractions of the serum. It is pointed out that these findings emphasize the close physiological relationship between the vector and the host from which it takes up parasites, and reference is made to a further paper which will consider the influence of the physiological state of the host on the infection in the vector. *D. S. Bertram*

TRYPANOSOMIASIS

Geigy, R. & Huber, M. Untersuchungen über Bau und Funktion der Stigmen bei verschiedenen *Glossina*—Arten und bei *Stomoxys calcitrans*. [**Investigations on the Structure and Function of the Stigmata in *Glossina* spp. and *S. calcitrans***] *Acta Tropica.* Basle. 1952, v. 9, No. 3, 233–63, 9 figs. & 5 pls.

The authors approach an old problem by a new route. The problem is whether the characteristic limitation of species of *Glossina* to particular types

of vegetation is due to physical, climatic conditions. The method is to study respiration (it being implied that this must be closely linked to a very important part of water-loss).

The authors select 5 species of *Glossina*, from those occurring in drier, moderate and moister environments. They find little structural difference in the stigmata ; one might have expected a smaller orifice in species occurring in drier places. If individuals are moved from moist to dry air, one cannot observe that the spiracles remain closed for longer periods in the dry air, which would reduce loss of water. The authors' field measurements lead them to think that even in the dry season there is little difference in temperature and humidity between fly haunts in different types of vegetation [but figures from the extreme climate of northern Nigeria, pointing to the reverse conclusion, are not quoted].

Stomoxys calcitrans is perhaps more sensitive to low humidity than *G. palpalis*. The spiracles are more often closed in dry than in moist air ; this is marked in recently fed individuals, which must open the spiracles because of high metabolism. The paper is fully illustrated by drawings, photographs and tables. *P. A. Buxton*

JONCHERE, H. Note technique concernant l'emploi du mélarsen oxide dans le traitement de la trypanosomiase humaine. [**A Technical Note on the Treatment of Human Trypanosomiasis with Melarsen Oxide**] *Bull. Méd. de l'Afrique Occidentale Française.* 1952, v. 9, No. 1, 29–40. [12 refs.]

The author reviews the results published during recent years of various clinical trials and laboratory experiments with melarsen oxide and Mel B ; all, or nearly all, the papers mentioned have been abstracted in this *Bulletin*.

The International Committee for Research on Trypanosomiasis, which met at Bobo-Dioulasso in 1951, considered that further trials should be made with melarsen and melarsen oxide, the forerunners of Mel B ; the author makes suggestions as to the dosage of melarsen oxide and precautions advisable in such trials. For patients with only moderate changes in the cerebrospinal fluid a single course of treatment is advised while for patients with greater involvement of the central nervous system and those whose previous treatment has failed and who would consequently die of the disease, two courses should be given. A course should consist of three daily intravenous injections of 3 mgm./kgm. for a patient weighing 60 kgm. or more ; the injections should be given slowly with the patient fasting and no food should be taken for two hours after an injection. The patient should be treated in hospital and should stay there for at least 12 days after the last injection. In old cases resistant to previous treatment melarsen oxide should not be given until 3 months after the end of such previous treatment. Treated patients should be medically examined 1, 3 and 6 months after treatment and then every 6 months for the next 3 years. [A few misprints include HAW RING, F. for HAWKING, F. and *Ann. Journ. Trop. Med.* p. 243 for *Amer. J. Trop. Med.* p. 343.] *J. F. Corson*

UGANDA PROTECTORATE. **Annual Report of the Tsetse Control Department for the Year ended 31st December, 1951** [MOGGRIDGE, J. Y., Director]. 22 pp., 1 folding coloured map. 1952. Entebbe : Govt. Printer. [Shs. 1/50.]

The Tsetse Control Department of Uganda reports a successful year : indeed it has even been found unnecessary to replace officers who have left the Department. The Report is illustrated by a map showing the 15 areas in which control work has been carried out. The text is, rightly, full of detail and points of local interest. In several areas tsetse is receding and though one would

not question that this may often be due to the Department's work, it may be felt that the natural waxing and waning of fly populations has influenced the results.

P. A. Buxton

Goodwin, L. G. & Unsworth, K. **The Chemotherapeutic Action of Phenanthridine Compounds. Part V. The Effect of Four New Phenanthridine Derivatives upon Fly-Transmitted *T. vivax* Infections in Cattle.** *Brit. J. Pharmacol. & Chemotherapy.* 1952, Dec., v. 7, No. 4, 581–90, 1 fig.

Goodwin, L. G. & Chandler, R. L. **The Chemotherapeutic Action of Phenanthridine Compounds. Part VI. The Prophylactic and Toxic Actions of 2 : 7-Diamino-9-*p*-Aminophenyl-10-Methylphenanthridinium Chloride (150C47) and Iodide.** *Brit. J. Pharmacol. & Chemotherapy.* 1952, Dec., v. 7, No. 4, 591–600, 4 figs. [24 refs.]

See also p. 260, Geigy & Kraus, Rüssel und Stechakt von *Rhodnius prolixus*. [**The Proboscis and Biting Mechanism of *Rhodnius prolixus***]

Pifano C., F., Medina, R. & Anduze, P. Representantes venezolanos del género *Eratyrus* (Hemiptera, Triatomidae) y redescripción del *Eratyrus mucronatus* Stal, 1859. [**Incidence of *Eratyrus* in Venezuela and Redescription of *Eratyrus mucronatus***] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1950, Jan., v. 2, No. 1, 249–55, 1 fig.

The English summary appended to the paper is as follows :—

"A review is made on the triatomidae species of the genus *Eratyrus* Stal, 1859 studied in Venezuela.

"*Eratyrus cuspidatus* Stal, 1859 is known in this country since 1919 and its infection by *Schizotrypanum cruzi* has been demonstrated in natural conditions. *Eratyrus mucronatus* Stal, 1859 has been found in recent date by the authors who make a redescription of the species presented in this paper."

Pifano C., F. & Benaím Pinto, H. La Miocarditis crónica en Venezuela. Estudio analítico y sintético del problema etio-patogénico de la Miocarditis crónica en el medio rural venezolano. [**Chronic Myocarditis. A Study of its Pathogeny in Rural Districts of Venezuela**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1950, Jan., v. 2, No. 1, 223–34. [27 refs.] English summary.

Chronic myocarditis, as evidenced by changes in cardiac rhythm, by dilatation, by faulty conduction and other disturbances, has been observed by several authorities in Venezuela and particularly by the authors of this article which is, in fact, largely based on a communication on Chagas's disease contributed by them to the Pan-American Congress at Tucumán in July, 1949.

There are 4 diseases mainly responsible for chronic myocarditis in Venezuela, *viz.*, syphilis, schistosomiasis mansoni, ankylostomiasis and Chagas's disease. Deficiency of the vitamin B complex in the diet is also held as partly responsible. These are considered, with numerous references to the literature, but in general terms only ; very few figures are given. The most detailed are 42 cases at the Vargas Hospital studied by the junior author and Drayer in 1949. These were investigated clinically, electro-cardiographically and radiologically and 12 were examined *post mortem*. The ages of the patients ranged between 18 and 77 years ; 21 were xeno-positive for *T. cruzi*, with *Necator americanus* in 15, *S. mansoni* in 6, syphilis in 5, anaemia in 5 and chronic glomerulonephritis in 2. [Some of the patients had, therefore. more than one infection.] Of

the 21 xeno-negative, *N. americanus* was present in 12, *S. mansoni* in 2, syphilis in 9, anaemia in 3, and glomerulonephritis in one. The myocarditis may be the result of direct action of the parasites or their toxins, or allergic reactions to the toxins. No decision is reached but the authors ask for further investigation to determine what part each plays. *H. Harold Scott*

MARCUZZI, G. Estudio experimental sobre la Miocarditis. [**Experimental Study of Myocarditis**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1950, Jan., v. 2, No. 1, 309–76, 15 figs. [43 refs.]

The contents of this long article may be summed up fairly briefly. The causes of chronic myocarditis in Venezuela are mainly 4 in number [see PIFANO and PINTO above] : syphilis, trypanosomiasis (*T. cruzi*), schistosomiasis (*S. mansoni*) or other helminth (*Necator americanus*) and avitaminosis (vitamin B_1 and PP (nicotinic acid). Chronic myocarditis is comparatively common in Venezuela and it is important, at all events interesting, to know what part each of these causes plays. The author has undertaken experimental work to test this. He describes in histological detail the structure of the normal cardiac musculature in man and in certain laboratory animals, guineapigs, rats and mice, and the skeletal muscles of insects ; and, next, the effects of chemical agents (pepsin, hydrochloric acid, acetone and fat solvents) of avitaminosis and of *T. cruzi*. Next, the histological changes in the heart muscles in cases of natural infection of man and opossum, of combined trypanosomiasis and avitaminosis, of mice infected with *S. mansoni* and with this *plus* vitamin B_1 deficiency are described with photomicrographs to illustrate the changes.

After all this work it must have been very disappointing to have to conclude in the words of the author [translated]: " In the lesions met with there is nothing specific ; there exists a variety of histopathological changes ranging from the purely degenerative to the inflammatory with histiocytes and giant-cells, but no picture corresponds definitely with functional change, clinical state or experimental results from a known cause. All this indicates that the causes determining the lesions are probably multiple and, as a corollary to this, the myocardium responds in different ways to a given stimulus."

H. Harold Scott

PIFANO C., F. & MARCUZZI, G. Contribución al estudio experimental de las miocardiopatías parasitarias de la región neotrópica. Investigaciones histopatológicas sobre el miocardio de ratones blancos infectados experimentalmente con *Schizotrypanum cruzi* y *Schistosoma mansoni*, sometidos a dietas carentes en Vitamina B_1 y Factor PP. Comunicacion preliminar. [**Experimental Study of Parasitic Myocardiopathy in the Neotropical Region. Histopathological Studies on the Myocardium of White Rats Experimentally Infected with *T. cruzi* and *S. mansoni* on Diets Deficient in Vitamin B_1 and PP Factor**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1950, Jan., v. 2, No. 1, 175–82.

The English summary appended to the paper is as follows :—

" The author makes a report of histopathologic studies performed on the heart of animals (white mice) experimentally infected with *Schizotrypanum cruzi* and *Schistosoma mansoni*, both in pure infection and infections associated with diets deprived of the vitamin B_1 complex and the PP factor. A diffuse myocarditis was found only in the animals infected with *Schizotrypanum cruzi*. It seems that these lesions are aggravated by the deficiency, but an investigation on a larger scale is required in that direction. Myocardial

degenerative changes, without myocarditis, were seen in the animals infected with *Schistosoma mansoni*, in pure infection and associated with the deficiencies."

GROOT, H. **Further Observations on *Trypanosoma ariarii* of Colombia, South America.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 585–92.

In a previous paper the author and his associates [this *Bulletin*, 1952, v. 49, 760] described under the name *Trypanosoma ariarii*, a trypanosome related to—if not identical with—*T. rangeli*, which they found in human beings in Colombia. In the present paper they deal with the development of this trypanosome in the vector, *Rhodnius prolixus*.

Both in wild bugs, captured in a house where a case of human infection was detected, and in bugs experimentally infected from rats and dogs, flagellates were found in the haemolymph and salivary glands. Repeated examination of the body fluid (by incision of a limb) showed that it was usually invaded some weeks after the infective meal, while dissection of the salivary glands and transmission experiments showed that some days must elapse before the flagellates reach the salivary glands. Once the infection is established, the body cavity and the glands may contain enormous numbers of flagellates, represented by leptomonads, crithidial forms and trypanosomes.

Rats were successfully infected through the bites of bugs with an established haemolymph and salivary infection. The possibility of contaminative transmission through the faeces was excluded by placing the bugs in narrow tubes, in which they could not turn round. In the infected rats *T. ariarii* first appeared in the blood from 10 to 48 hours after the bite.

From these observations it is concluded that *T. ariarii* undergoes a cyclical development in *Rhodnius*, in the course of which the trypanosomes, taken up with the blood of an infected animal, first develop in the gut, and later invade the body cavity, whence they penetrate into the salivary glands. The infection in such cases is inoculative, through the bite of an infected bug. But since it has previously been shown that the faeces of infected bugs contain trypanosome forms, which are capable of infecting dogs, the contaminative method of transmission of *T. ariarii* cannot be excluded.

[The occasional presence of flagellates in the body cavity and salivary glands of the insect-vector has previously been reported for *T. cruzi* and *T. rangeli*, but *T. ariarii* is the first example of a trypanosome with a dual course of development, one terminating in the "posterior station" and associated with contaminative transmission (as in other members of the *lewisi* group), the other terminating in the "anterior station" and associated with inoculative transmission (as in the *brucei* group). If confirmed, this case might throw light on the transition from the former to the latter life-cycle, which has probably occurred in the course of evolution of the pathogenic African trypanosomes (*cf.* HOARE: *Proc. 4th Intern. Congr. Trop. Med. Malaria*, Washington, 1948, v. 2, p. 1110).]

C. A. Hoare

LEISHMANIASIS

ROTBERG, A. Contribuição para o estudo da alergia na leishmaniose tegumentar americana. [**Allergy in American Cutaneous Leishmaniasis**] Reprinted from *Rev. Hosp. N.S. Aparecida*. 1952, v. 5, No. 1, 88 pp., 48 figs. [40 refs.] English summary.

The full title of this thesis is, in addition to the above, early and late quantitative reactions to the known leishmanines and to a new leptomonas hydrolysate; cutaneous reactions and problems connected therewith.

The specific allergic reaction in sufferers from cutaneous leishmaniasis inoculated intradermally with a suspension of leptomonad forms of *Leishmania brasiliensis* has for many years been known as the Montenegro reaction. Spontaneous clinical lesions, such as the profuse secondary papular eruptions, are also allergic in nature and go by the name of leishmanides, analogous with tuberculoid leprides and syphilides.

In this work the author has enlarged his previous account [see this *Bulletin*, 1952, v. 49, 30] and brought together, with a running commentary and illustrative cases, practically all that is known and has been published on the question, and he deals with it under 7 heads :

1. The history of the Montenegro reaction, including the earlier researches of WAGENER, MONTENEGRO, and JESSNER and BUSS.
2. Quantitative reactions as applied to cutaneous leishmaniasis in America.
3. Relation of actual cases and the reactions in them and in controls, noting certain false positives in some of the latter. But these cases can be mistaken only in the early stage of the reaction, for the papules are smaller and disappear more rapidly than in patients with the real disease. In this section the differences between the early (48 hours) and late (8 and 21 days) phases of the reaction are shown in their general appearance, their evolution and the strengths of the antigen.
4. Reactions to suspensions of *T. cruzi* and *Leishmania enriettii*, the natural cutaneous leishmanial infection of guineapigs.

5 and 6. A study of the comparisons between the early and late reactions and the different extracts and emulsions noted.

7. A study of 4 new preparations tested for allergic response, *viz.* — (i) a hydrolysed filtrate of leptomonads, hydrolysed by keeping in distilled water in the ice-chest for 5 days with daily de-freezing and shaking and filtered free from leptomonads ; (ii) the leptomonad detritus left after hydrolysis ; (iii) the skin reaction to the leptomonad residue, corresponding to the von Pirquet test in tuberculosis ; (iv) local reaction like the Mantoux test, using dried leptomonads of *L. brasiliensis* in form of powder.

In order that records may be comparable it is essential that the suspensions of leptomonads for the Montenegro test should be standardized ; hitherto the differences have been great : LOPES and LAENDER use one of 5 millions per ml., CORREA recommended 3–5 millions, BUSS 3 millions, PESSÔA and PESTANA 2–3 millions, SALLES GOMES 1 million. The author used suspensions from 10^4 (10,000) to 10^7 (10,000,000) per ml. and noted the size of the reaction in each case after 72 hours and the discoloured tubercle after 15 days and the evolution to ulceration or healing after 25 days. In others the results were noted after 48 hours and after 6 weeks ; in one patient who had had his lesion for only 5 months the readings were noted at 48 hours and 10 days. Photographs illustrate clearly the results and photomicrographs the histopathology of the lesions produced.

The author's tests were carried out between October 1947 and May 1951 on 92 cases of American cutaneous leishmaniasis and 41 controls suffering from various diseases, syphilis, primary, secondary and tertiary, from blastomycosis, mycetoma, simple ulcers of the leg, granuloma venereum and tuberculous adenitis with suppuration.

In 55 cases of cutaneous leishmaniasis and 29 controls 0·1 ml. of the different suspensions was injected intradermally. Doubt might arise at the early reading (up to 72 hours) because both groups showed small papules up to 5 mm. in diameter, which persisted for 2 weeks or even longer, but in those with cutaneous leishmaniasis the papules were usually a little larger and certainly more inflammatory, even pustular and bullous in some cases, with a distinct halo. The late reaction is probably distinct from, and not merely a residue of the

earlier phase, because there is no certain correlation between them ; severe early reactions with halo may clear without necrosis, and, *vice versa*, necrotic late reactions may not have been preceded by severe early reactions with halo and with the lower dilutions, 1,000 and 10,000 per ml., the early reaction might be minimal, but the late nonetheless typical.

T. cruzi suspensions gave positive but weak reactions ; *L. enriettii* also but stronger than *T. cruzi* though weaker than *L. brasiliensis*. The degree of early response to broken-up leptomonads seemed to depend on the degree of fragmentation, the more minute the fragments the greater the reaction, which is accounted for by the more extensive area of contact between the antigen constituents and the cutaneous antibodies. Of the new antigens, the filtered hydrolysate proved negative in the controls but yielded definite early reactions in the infected. The value of this antigen needs to be tested further because the late reactions to it varied considerably. Of the patch tests, the dried powdered antigen was the only one productive of results ; the suspension in glycerol gave good reactions in all the genuine cases of cutaneous leishmaniasis and it is recommended as of diagnostic value in mass testing in areas of endemicity.

[This subject has been frequently referred to in the *Tropical Diseases Bulletin*, but special attention may be drawn to the following : 1926, v. 23, 585 ; 1929, v. 26, 747 ; 1936, v. 33, 21 ; 1940, v. 37, 778 ; 1945, v. 42, 979 ; 1946, v. 43, 834, 1129 ; 1947, v. 44, 889, 987 ; 1951, v. 48, 722 ; 1952, v. 49, 30, 131.]

H. Harold Scott

FEVERS OF THE TYPHUS GROUP

VAN BOMMEL, L. B. Epidemische vlektyphus en haar bestrijding in Zuid-Korea. [**Typhus in South Korea**] *Nederl. Tijdschr. v. Geneesk.* 1952, Oct. 11, v. 96 (iv), No. 41, 2562–5, 1 fig.

A campaign to suppress typhus among the 20 million inhabitants of South Korea has been undertaken by the United Nations Civil Assistance Command. The population was made aware of the scope and purpose of the operation by an intensive publicity campaign, and delousing centres were set up, each staffed by a doctor, 2 nurses and 2 assistants. Dusting next to the skin was carried out with 10 per cent. DDT powder in talc, between 30 and 50 gm. being used on each person ; between January and September 1951, 15,314,000 South Koreans received at least one treatment. Buildings were disinfested with 5 per cent. DDT in paraffin at the rate of 2 gm. DDT per square metre ; 2 per cent. phenol was added in order to destroy rickettsiae in louse faeces. Resistance of lice to DDT was noted in several localities and trials of pyrethrum and lindane were made.

Vaccination with American Army typhus vaccine was also carried out, and 14,515,630 persons (68 per cent. of the population) received at least 1 cc. of vaccine. Smallpox and typhoid vaccinations were often carried out at the same time, and persons who received all 3 vaccines were issued with a vaccination card which conferred certain advantages in obtaining food rations.

Much assistance was rendered by Korean local authorities, students and scout organizations in tracing contacts of cases of typhus and other infectious diseases. Cases were treated in isolation units set up in commandeered schools ; aureomycin was usually effective in reducing the temperature to

normal within 48 hours, but its use was restricted by financial considerations. Laboratory facilities were primitive, but the Danish hospital ship Jutlandia assisted by supplying suspensions of the usual strains of *Proteus*.

D. J. Bauer

KRYŃSKI, S. & RADKOWIAK, J. **Principles of Cultivation of *Rickettsia prowazeki* by Weigl's Method.** *Bull. State Inst. Marine & Trop. Med., Gdańsk, Poland.* 1952, v. 4, No. 2, 237–44. [Also in Polish 213–27, 1 chart & 5 figs. & Russian 227–36.]

The typhus vaccine used in Poland is made by Weigl's method, and a detailed account is given of the methods of cultivating *Rickettsia prowazeki* in lice. The breeding of lice, infection with rickettsiae, removal of intestines and methods of microscopic examination are described in detail. The English version is an adequate translation of the Polish original, and will afford a useful source of information for those who are interested in the subject. Most of the text consists of a summary of papers which have already been abstracted in this *Bulletin* [see, for instance, 1951, v. 48, 723, 724]. *D. J. Bauer*

BRICEÑO MAAZ, T. Tifus exantemático murino. Presentación de 33 casos. [**Murine Typhus. A Study of 33 Cases in Venezuela**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1950, Jan., v. 2, No. 1, 145–74, 1 map, 8 charts & 2 figs. [14 refs.] English summary.

RODRIGUES, P. M. & TRAVASSOS, J. Aplicação da reação de Bengtson ao diagnóstico das riquetsioses benignas em São Paulo. [**The Bengtson (Complement-Fixation) Test in the Diagnosis of Benign Rickettsioses in São Paulo**] *Rev. Inst. Adolfo Lutz.* São Paulo. 1951, v. 11, 119–39. [32 refs.] English summary.

The authors describe their attempts to differentiate between murine and epidemic typhus by the Bengtson modification of the complement-fixation test in 51 cases of benign typhus-like fever in which there was a positive Weil-Felix reaction and a complement-fixation reaction with murine or epidemic typhus antigen or with both antigens.

In most of the cases the clinical and epidemiological evidence favoured the diagnosis of murine typhus and *Rickettsia mooseri* was isolated from some patients, but even in these proved cases the fixation test sometimes gave anomalous results such as higher titres with epidemic than with murine antigen at one stage and the opposite result at another stage.

Serum from one of 4 cases of laboratory infection with fully identified *R. mooseri* gave conflicting responses ; a sample was sent to the Army Medical School, Washington, 4 months after the attack and the reaction was found to be positive at a slightly higher titre with epidemic than with murine antigen ; but with the rickettsia-agglutination test the titre for murine rickettsiae was significantly higher than for epidemic rickettsiae.

The findings tend to support the views of some workers who doubt the reliability of the complement-fixation test as a method of differentiating murine from epidemic typhus infection. *John W. D. Megaw*

GUNTHER, C. E. M. **A Check List of the Trombiculid Larvae of Asia and Australasia.** Reprinted from *Proc. Linnean Soc. of New South Wales.* 1952, July 3, v. 77, Pts. 1/2, 1–60. [Numerous refs.]

SMADEL, J. E., LEY, H. L., Jr., DIERCKS, F. H. & CAMERON, J. A. P. **Persistence of *Rickettsia tsutsugamushi* in Tissues of Patients recovered from Scrub Typhus.** *Amer. J. Hyg.* 1952, Nov., v. 56, No. 3, 294–302, 1 fig. [25 refs.]

Attempts were made to recover *Rickettsia tsutsugamushi* [*orientalis*] from lymph nodes of 12 volunteers who had been attacked by scrub typhus 1–2 years previously, and had been treated with chloramphenicol or chloromycetin. Only one of these attempts was successful. Nine of the volunteers were later inoculated with 9–85 mouse minimum infecting doses of the Gilliam strain of the organism ; 4 were resistant to reinfection, including the one from whom rickettsiae had been recovered ; the other 5 had attacks which yielded promptly to chloramphenicol. A rising-titre reaction for *Proteus OXK* was observed in only one of the 9 persons who were inoculated ; the rise was from 1–20 to 1–80 ; it occurred in a susceptible volunteer.

Before inoculation only 2 of the 12 volunteers gave any reaction with the complement-fixation test in which Gilliam antigen was used, and the titres observed were only 1–2 and 1–4. Three of the persons who resisted inoculation were tested later and gave responses at titres rising from 1–2 to 1–8 ; from 1–4 to 1–8 ; and from 0 to 1–16 respectively. All the 5 persons who resisted reinfection had been negative before inoculation and afterwards reacted ; at titres of 1–32 in 2 cases ; at 1–8 in 2 cases ; and at 1–4 in the remaining case.

From the findings in the present study and consideration of the other available evidence the authors conclude that the rickettsiae of scrub typhus rarely persist for long periods of time and that when they do persist a condition of premunition is likely to remain. It is thought likely that recrudescences of the disease comparable to Brill's disease may be expected to occur. *John W. D. Megaw*

LEY, H. L., Jr., DIERCKS, F. H., PATERSON, P. Y., SMADEL, J. E., WISSEMAN, C. L., Jr. & TRAUB, R. **Immunization against Scrub Typhus. IV. Living Karp Vaccine and Chemoprophylaxis in Volunteers.** *Amer. J. Hyg.* 1952, Nov., v. 56, No. 3, 303–12, 2 figs. [13 refs.]

The studies described in this paper are in continuation of those reported by SMADEL *et al.* who showed that volunteers could be immunized against the Gilliam strain of scrub-typhus rickettsiae by inoculation with the live homologous strain combined with prophylactic treatment by chloramphenicol [see this *Bulletin*, 1951, v. 48, 977 ; 1952, v. 49, 682].

In the present experiments a live strain of the supposedly more virulent Karp rickettsia was used instead of the " attenuated " Gilliam strain for the inoculation of volunteers. Although the latter strain was much less virulent for mice it caused an equally severe infection in man, and for various reasons the Karp strain was considered more suitable.

All the 42 volunteers were inoculated with 50–100 minimum infecting doses for mice ; one group of 12 persons served as controls and were given no treatment till 8 hours after the onset of their attacks which occurred with great regularity 10 or 11 days after inoculation and were typical of scrub typhus with rickettsaemia. Five groups, each of 6 persons, were given various courses of chloramphenicol. One group received 1·0 gm. daily for 28 days, starting from the day of inoculation. No signs or symptoms of disease occurred till 4 days after the last dose, when premonitory symptoms occurred in 5 of the 6 volunteers and 2 days later 4 of them became definitely febrile. Rickettsiae could not be recovered from the blood while the drug was being given but they were present in 4 cases soon after the last dose was administered.

To 3 groups, each of 6 persons, the drug was given in doses of 3·0 gm. at 4-day intervals, starting on the 7th day after inoculation. The groups received

4, 5 and 6 doses respectively. Although rickettsiae were recovered from the blood of all the persons tested on the 11th day after inoculation, and from about half of those tested from the 12th to the 16th day, no febrile attacks of any consequence occurred during or after the course of chemoprophylactic treatment. All the 8 who were tested for immunity a month later against the homologous strain were found completely resistant to infection, whereas among 8 who were tested against the Gilliam strain 3 developed mild, but recognizable, attacks of fever so that solid heterologous immunity was of relatively short duration.

The remaining group of 6 persons were given doses of 2·0 instead of 3·0 gm. of chloramphenicol on 4 occasions on the same lines as the preceding 3 groups ; all of them developed fever during the period of the prophylactic treatment so it appeared that doses of 3·0 gm. every 4 days were the smallest needed to ensure suppression of the disease.

The authors conclude that immunization against scrub typhus by a combination of live vaccine and chemoprophylaxis is of limited practicability, though it does provide the only available method of immunizing the individual without inflicting on him the consequences of the full-blown disease.

John W. D. Megaw

LEY, H. L., Jr., SMADEL, J. E., DIERCKS, F. H. & PATERSON, P. Y. **Immunization against Scrub Typhus. V. The Infective Dose of *Rickettsia tsutsugamushi* for Men and Mice.** *Amer. J. Hyg.* 1952, Nov., v. 56, No. 3, 313–19, 1 fig. [20 refs.]

The authors have collected and presented in orderly form data which go to show that for the 3 best known strains of *Rickettsia tsutsugamushi* the minimum infecting dose for mice by the intraperitoneal route (Mouse MID) are approximately the same as the minimum infecting doses for men inoculated intradermally. Most of the data were obtained in the course of the experiments referred to in the preceding abstract and of other experiments on human volunteers. The strains dealt with were the Gilliam ; the Karp ; and one called CP–14, which resembled the Karp in having almost identical infecting and lethal doses for mice, whereas the lethal dose of the Gilliam strain for mice was generally several thousands of times greater than the minimum infecting dose.

In the experiments on the production of live vaccines it was found that the infecting dose for man of strain CP–14 was rather less than 1·0 Mouse MID ; for the Karp strain the corresponding dose for man was 1·5, and for the Gilliam strain it was 9·0. Additional information was obtained by observation of groups of volunteers inoculated with different doses of live Karp or CP–14 strains which had been titrated by inoculation into mice. A close correspondence was found between the mouse and human infecting doses of each strain.

The authors seem fully justified in claiming that despite the differences in the infecting routes employed, to the best of their knowledge, this is " the only study in the literature in which the infecting dose for man of a rickettsial agent has been defined with accuracy ".

An interesting summary is given of the information available in the literature on the subject of the minimum infecting doses of various pathogenic organisms, including *Plasmodium vivax*, 6 types of *Salmonella*, *Shigella paradysenteriae* [*Sh. flexneri* type 2a], poliomyelitis virus and West-Nile virus.

John W. D. Megaw

HARRIS, B. P. **Aureomycin in Tick Typhus.** *East African Med. J.* 1952, Sept., v. 29, No. 9, 403–10, 6 charts.

An account of 7 cases in East Africa. Satisfactory and rapid response was obtained with the use of aureomycin to a total dosage of about 10 gm. Full clinical details are given.

DE MACEDO, J. J., BRANDÃO, C. H. & MONTEIRO, E. L. Ação da aureomicina sôbre a febre maculosa experimental em cobaias. Sua atividade, após a adaptação à via parenteral, sôbre rickettsias isoladas em São Paulo. [**The Action of Aureomycin on Experimental (Rocky Mountain) Spotted Fever in Guineapigs**] *Rev. Inst. Adolfo Lutz.* São Paulo. 1951, v. 11, 159–62. English summary. [French version 163–5.]

The opening words of this paper are, it is known that aureomycin is the antibiotic of choice for the treatment of the rickettsioses. This assertion is said to have been confirmed by 5 reports to which references are given in the text.

The action of the drug was tested on groups of guineapigs, weighing about 500 gm. each ; these were inoculated intraperitoneally with highly virulent *Rickettsia rickettsi* isolated at São Paulo. Aureomycin adapted for parenteral injection was dissolved in 1·0 per cent. watery solution of procaine hydrochloride and was injected under the skin. The results of the experiments on different groups of guineapigs are stated in general terms and were as follows :—Doses of 2·0 mgm. given daily for 7 days from the day of inoculation prevented the occurrence of fever or other reactions. The same doses, given for 3 days, starting 72 hours after the onset of fever, caused an immediate fall of temperature and permanent cure. A single dose of 10 mgm. given 72 hours after the onset of fever was equally successful, but the same dose given at the time of inoculation failed to protect 3 of the 10 guineapigs though the incubation period was greatly prolonged. Three lots of guineapigs were treated respectively with single doses of 0·5, 1·0 and 2·0 mgm. when the temperature reached 39·6°C. An appreciable number of the animals of each group survived and although this number was greatest in the group treated with the largest dose the authors thought that generally speaking the results were the same in all three groups.

The drug as ordinarily supplied for oral administration, when dissolved in 1·0 per cent. novocaine, was also found suitable for subcutaneous injection when tested on patients and it is thought possible to give it in this way or by the intramuscular route without loss of anti-rickettsial activity.

John W. D. Megaw

KNUTSON, H. **A Community Project for Control of the American Dog Tick.** *J. Econom. Entom.* 1952, Oct., v. 45, No. 5, 889–90.

" A community-sponsored program with prior professional advice but very limited professional supervision resulted in between 90 and 100 per cent control of *Dermacentor variabilis*. Control was accomplished by 50 per cent DDT wettable powder at 8 pounds to each 100 gallons of water applied to a 6 to 8 foot strip bordering several miles of roadside and paths, at the rate of 4 pounds of actual DDT per acre."

WYATT, G. R. & COHEN, S. S. **Nucleic Acids of Rickettsiae.** [Correspondence.] *Nature.* 1952, Nov. 15, v. 170, 846–7.

It has been shown previously that in *Rickettsia burneti* cultured in chick embryos, the deoxyribonucleic acid (DNA) composition is closely similar to that of the host tissue except that it lacks 5-methyl cytosine [this *Bulletin*, 1952, v. 49, 259]. To account for this fact it was suggested that ribonucleic acid was assimilated from the host. The present authors had determined the purine and pyrimidine composition of DNA in *R. prowazeki* grown in the same host after isolation of the acid and hydrolysis by perchloric acid. It was found in this case also that 5-methyl cytosine was absent. The relative values obtained for adenine, thymine, guanine and cytosine present in the two

rickettsiae are given in a table, which indicates that the composition of DNA from *R. prowazeki* differs from that of the host tissue of *R. burneti*. Investigation by others has likewise indicated that the DNA composition of phage and host cell also differ. It is pointed out that the fact that nearly constant ratios of adenine to thymine and of guanine to cytosine are present in deoxyribonucleic acids, renders it more probable that these acids from different sources should resemble one another in composition and this fact may account for the observation made concerning the DNA composition of *R. burneti* and its embryo host.

J. D. Fulton

YELLOW FEVER

World Health Organization : **Endemic Yellow Fever Areas as delineated by WHO.** Suppl. to *Weekly Epidem. Record. R.E.H. No. 300.* 1952, Sept. 20, v. 27, No. 39, 1–3, 2 maps. [1952/Supp./Y.F. End. Areas.]

The first delineation of the endemic yellow fever areas in Africa and America was carried out by UNRRA in 1945 and 1946 [this *Bulletin*, 1946, v. 43, 124, 126]. This was modified in 1950 and 1951 by WHO. The areas at present delineated by WHO are now shown in two maps and are as follows :—

" *African Endemic Yellow Fever Area.*—From the mouth of the River Senegal along that river eastwards to the 15° North parallel of latitude ; thence eastwards along that parallel to the eastern border of the Anglo-Egyptian Sudan ; thence northwards along the north-western boundary of Eritrea to the Red Sea Coast ; thence southwards along the eastern coast of Africa to the northern boundary of the French Somali Coast ; thence along that boundary successively westwards, southwards and eastwards to the southern boundary of British Somaliland and along that boundary eastwards and northwards to the eastern coast of Africa and thence along this coast to the southern boundary of Tanganyika territory ; thence westwards along that boundary to its junction with the eastern boundary of the Belgian Congo ; thence westwards and southwards along the boundary of the Belgian Congo to the 10° South parallel of latitude ; thence westwards along that parallel to the west coast of Africa ; thence northwards along the west coast of Africa to the mouth of the River Senegal ; including the islands of the Gulf of Guinea. The Barotse Province and the Balovale District in the Western Province of Northern Rhodesia are also included in the endemic area. The port of Massawa in Eritrea and an area of 10 kilometres in radius from the centre of the town of Asmara in Eritrea, as well as the territory of the French Somali Coast, including the port of Jibuti, and the territory of British Somaliland are excluded from the endemic area. The continued exclusion of these areas is, however, contingent on their maintenance of an *Aedes aegypti* index not exceeding 1%* in the port of Massawa, in and around Asmara, in the port of Jibuti and in the British Somali ports of Berbera, Hergeisa and Zeilah, as reported quarterly to WHO.

" *The American Endemic Yellow Fever Area.*—This area is bounded by a line beginning on the Pacific Coast of Colombia at the 5°N. parallel of latitude and extending east along that parallel of latitude to the eastern slopes of the Central Cordillera to an elevation of 2,000 metres ; thence southwards along the eastern slopes to the Central Cordillera and the Andes Mountains, at the same elevation to the boundary of Bolivia and Argentina ; thence eastwards and northwards along the southern and eastern boundaries of Bolivia to the 15°S. parallel of latitude ; thence eastwards along that parallel of latitude to the western boundary of the State of Goiaz ; thence northwards along that boundary and

the western boundary of the State of Maranhao to the Atlantic Coast ; thence along the Atlantic and Caribbean coasts of America to the eastern boundary of Costa Rica ; thence along that boundary to the Pacific Coast and thence along the Pacific Coast of Panama and Colombia to the 5°N. parallel of latitude. In addition, the Ilheus and Itabuna Districts in the State of Bahia in Brazil bounded on the north by the River Contas, on the west by the 40°W. meridian of longitude, on the south by the River Pardo and on the east by the Atlantic Ocean are included in the endemic yellow fever area. The ports of Belem and Manaos in Brazil, Cayenne in French Guiana, Paramaribo in Surinam, Georgetown in British Guiana, the Caribbean ports of Venezuela and Colombia, the cities of Caracas in Venezuela and Bogota in Colombia, together with the ports of the Republic of Panama and the Panama Canal Zone are excluded from the endemic yellow fever area. The continued exclusion of these ports and cities is, however, contingent on their maintenance of an *Aedes aegypti* index not exceeding 1%*, as reported quarterly to WHO."

" * Should, at any time, the index exceed 1%, in any of the localities excluded from the endemic area, information to that effect must be immediately notified to WHO."

Although the delineation is established in accordance with a Convention which will be replaced by the International Sanitary Regulations on October 1st, 1952, it must be considered, from that date, as the delineation of Yellow Fever Endemic Zones under the provisions of the Regulations, so long as no modification is made by WHO, in consultation with the health administrations concerned. Any change made will be published at once in the *Weekly Epidemiological Record*. *H. J. O'D. Burke-Gaffney*

Floch, H. La fièvre jaune en Guyane française. Rappel historique. [**History of Yellow Fever in French Guiana**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 266.* 1952, July, 7 pp.

Carpenter, S. J., Galindo, P. & Trapido, H. **Forest Mosquito Studies in an Endemic Yellow Fever Area in Panama.** *Mosquito News.* 1952, Sept., v. 12, No. 3, 156–64, 5 figs.

After an outbreak of sylvan yellow fever first recognized in Panama in January 1949, adult mosquito and larvae catching stations were established in Panama and Costa Rica to enable a survey of the forest mosquitoes to be made.

Three species, *Haemagogus spegazzinii falco*, *H. equinus* and *H. lucifer* were generally abundant, and 3 others, *H. argyromeris*, *H. chalcospilans* and *H. iridicolor* were less abundant. *Aëdes leucocelaenus*, a known vector of sylvan yellow fever in northern South America, was also present as were other species of *Aëdes*, *Sabethes* and *Trichoprosopon*. Members of the genus *Sabethes* may be regarded with suspicion as they seem to be the only diurnal, canopy-feeding mosquitoes remaining in the dry season when *Haemagogus* and *Aëdes* adults have disappeared. The habits of all the common species are described. There are 5 plates illustrating methods of collection. *H. S. Leeson*

Komp, W. H. W. **The Facultative Breeding of *Haemagogus spegazzinii falco* Kumm *et al.*, the Vector of Jungle Yellow Fever in Colombia.** *Amer. J. Trop. Med. & Hyg.* 1952, Mar., v. 1, No. 2, 330–32.

The breeding places of this species, of which larvae have been found on a few occasions only, are tree-holes in forest trees where, anomalously, very large numbers of adults occur in the canopy.

This paper notes, however, that in areas where tree stumps, cut bamboo, or fallen trees occur as a result of human activities and where human blood is readily available, the larvae are readily found at ground level breeding in the water-filled holes of the fallen trees and stumps. The significance of this facultative breeding in areas frequented by human beings in relation to their risk of being infected with yellow fever, is pointed out. *D. S. Bertram*

DENGUE AND ALLIED FEVERS

REAGAN, R. L. & BRUECKNER, A. L. **Studies of Dengue Fever Virus in the Cave Bat** (*Myotus lucifugus*). *J. Infect. Dis.* 1952, Sept.–Oct., v. 91, No. 2, 145–6.

A Hawaian strain of dengue virus which had undergone 114 intracerebral passages through mice has been transferred in the same way through cave bats (*Myotus lucifugus*) 6 times without loss of virulence.

The age of the bats is not stated but they reacted to inoculation as readily as the 3-week-old Swiss mice used in testing the strain at each passage. The strain at the 6th passage was verified by mouse-neutralization tests in which specific dengue antiserum from rabbits was used. The bats were selected for the trials because they had already been found highly susceptible to the virus of Newcastle disease (see REAGAN *et al.*, *J. Bacteriology*, 1951, v. 61, 37–40).

John W. D. Megaw

RABIES

SAUGRAIN, J. Quatre cas de rage humaine. [**Four Cases of Human Rabies**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 5, 587–92.

The cases occurred at Vietnam.

NIKOLITSCH, M. Beiträge zur Frage des Infektionsmechanismus bei den neurotropen Virusarten. [**Observations on the Method of Infection by Neurotropic Viruses**] *Arch. f. Hyg. u. Bakt.* 1952, v. 136, No. 8, 561–7.

The English summary appended to the paper is as follows :—

"At different times, two separate experiments were carried out in which rabbits that had been treated by insulin shock were inoculated, together with the controls, with smaller quantities of street virus. The controls remained unaffected while the animals treated with insulin shock, were taken by the disease. Therefrom, the conclusion is drawn that the effect of the infection does not only depend on the qualities of the neurotropic virus but also on the molecular structure of the nerve cells. This also explains why in cases of poliomyelitis, paralytic phenomena first occur in such regions of the body in which the inoculation had taken place. In cases of neurotropic infection it was observed that insanes and individuals who, due to antirabic vaccination had suffered and recovered from neurocomplications, are not affected by rabies."

FAGAN, R. **Ineffectiveness of Aureomycin and Terramycin against Rabies Street Virus in Mice.** *Proc. Soc. Exper. Biol. & Med.* 1952, Oct., v. 81, No. 1, 213–14.

"1. Neither aureomycin nor terramycin administered as described had an effect on the course of rabies in white mice when street virus was inoculated

into the masseter muscle. 2. The pH of the terramycin preparation tried was sufficiently low to exert a lethal action on the street virus. A control suspension buffered at the same pH as the terramycin solution exerted the same lethal effect on the street virus."

HASEEB, M. A. **Terramycin in the Treatment of Experimental Rabies in Mice.** [Correspondence.] *Nature.* 1952, Dec. 6, v. 170, 983.

Albino Swiss mice of average age of 3 weeks received 150 mgm. of terramycin per kgm. body weight twice daily for six days, the first injection being given half an hour after intracerebral inoculation with 0·03 ml. of 1 per cent. rabies brain emulsion. The strain of virus was a Paris fixed strain maintained in rabbits and sheep for 17 years. The LD50 for mice was 0·03 ml. $\times 10^{-5}$ brain emulsion.

Crystalline terramycin hydrochloride, 250 mgm., was emulsified with 25 ml. of McIlvaine's phosphate-citric-acid buffer solution, *p*H 7·0. The dose of 150 mgm./kgm. was given intramuscularly to 10 mice and intraperitoneally to 10 others. Ten mice were untreated and served as controls.

All 30 mice developed paralysis on the 6th day and died of typical paralytic rabies on that day or the next. In no respect were there any clinical differences between treated and control mice. It is concluded that terramycin was of no value in the treatment of experimental rabies in mice.

H. J. O'D. Burke-Gaffney

PIÉDROLA GIL, G. & BRAVO OLIVA, J. Vacunas irradiadas. Estudio en especial de los aparatos a utilizar y de la vacuna antirrabica U.V. [**Irradiated Vaccines. The Apparatus for Irradiation and its Use for Anti-Rabies Vaccine**] *Med. Colonial.* Madrid. 1952, Nov. 1, v. 20, No. 5, 391–406, 3 figs. [13 refs.]

The authors have made a study of the use of U.V. rays for the purification of viruses and bacteria, especially in the case of viruses causing infective hepatitis by homologous serum, at the same time retaining their high antigenic potency. In the present article they consider in turn : the use of U.V. lamps as germicides in general ; the apparatus and the mode of its use ; and the results in obtaining anti-rabies vaccine. The first two of these are highly technical ; the first dealing with the strength in Angström waves, the time of exposure and other details ; the second describing the optical details of the apparatus used and its mode of action. Those interested should consult the original in this regard ; it is too technical or not of sufficient interest for the general reader. The third point considered is the application of the method to anti-rabic vaccine. The set-up of the apparatus is shown and it was found that a 10 per cent. emulsion was inactivated by an exposure varying between 10 and 80 seconds and the result was a vaccine giving a protection against 21,580 MLD for mice intracerebrally injected. They obtain a vaccine of which 200 cc. of 10 per cent. strength is inactivated in 60 seconds and 190 cc. of a 20 per cent. strength in the same time. For human patients they give to adults and children over 4 years of age 1 cc. daily, for those under 4 years 0·5 cc. daily. The course is 14 days for those with wounds which are not deep and not near the head ; if on the legs or arms this plan is followed except for wounds of the thumb or the thenar eminence. For those with deep wounds or bites on the head or face the course is 21 days. If the facial wounds are severe or the patient is brought late, 1 cc. is given every 12 hours for the first 5 days, then every 24 hours till the 21 doses have been administered.

H. Harold Scott

THOMAS, A. K. **Studies on Rabies. VII. Observations on the Paralytogenic Factor in Rabies Vaccine.** *Indian J. Med. Res.* 1952, Jan., v. 40, No. 1, 121–9.

Thomas notes that one of the main drawbacks of prophylactic treatment with anti-rabies vaccine is the occurrence of [allergic] encephalomyelitis due to some paralytogenic substance in vaccines made from infected central nervous system, and that with some types of vaccine the chances of a "paralytic accident" following anti-rabies treatment are greater than those of acquiring rabies. Experiments were accordingly designed to remove the paralytogenic factor (*a*) by attempting to neutralize this factor with hyper-immune serum prepared against brain tissue containing fixed viruses; (*b*) by digestion of vaccine brain-tissue with cobra venom. Neither was successful. It was also found that sensitivity to the vaccine could not be transferred to guineapigs by inoculating them with serum from a monkey suffering from [allergic] encephalitis and subsequently challenging them with brain emulsion. *G. W. A. Dick*

CHOLERA

DE, S. N., BHATTACHARYYA, K. & RAYCHAUDHURY, P. K. ***In-Vitro* Study of the Actions of Terramycin and Chloromycetin against *Vibrio cholerae* (Preliminary Report.)** *Calcutta Med. J.* 1952, Sept., v. 49, No. 9, 360–61.

The authors refer to clinical trials of terramycin in the treatment of cholera [this *Bulletin*, 1952, v. 49, 691] and also to the effect of chloramphenicol on the vibrio *in vitro* [*ibid.*, 1951, v. 48, 988].

They have now tested the vibriostatic and vibriocidal action of these two antibiotics in more alkaline substrates, as the typical cholera stool is alkaline (*p*H 8·3–8·9).

Ten-fold dilutions of the antibiotics (0·01 to 100 μgm./ml.) were made in peptone water having *p*H of 7·4, 8·4 and 9 respectively. These were inoculated with 24-hour broth cultures of 4 strains of the Ogawa type *V. cholerae* and tested after 24 hours' incubation for bacteriostatic effects: where no growth occurred, further tests were made after 24 hours' incubation of loopfuls from such tubes, which had been inoculated into peptone water at *p*H 8·4 to determine bactericidal concentrations of the antibiotics.

The results are shown in tables, which indicate that terramycin was bacteriostatic at *p*H 7·4 in a concentration of 1 μgm./ml. while chloramphenicol required 1 or 10 μgm./ml.: at higher *p*H, up to 10 or 100 μgm./ml. of terramycin was required to produce bacteriostasis, but only 0·1–10 μgm./ml. of chloramphenicol was required for this purpose. For bactericidal action, larger concentrations were required, but while the action of terramycin was less marked in alkaline medium, that of chloramphenicol remained the same or improved with a rise of *p*H.

Chloramphenicol thus appeared to have an advantage over terramycin in its action against *V. cholerae in vitro*. Further experimental work is to be done.
H. J. O'D. Burke-Gaffney

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

SWARTZWELDER, C. **Laboratory Diagnosis of Amebiasis.** *Amer. J. Clin. Path.* 1952, Apr., v. 22, No. 4, 379–95, 4 figs. [21 refs.]

A very detailed account is given of the laboratory procedures for the diagnosis of intestinal and hepatic amoebiasis. In addition to precise technical information, the reader is warned against errors in the making of preparations and in interpreting the objects seen in them.

This paper does not lend itself to an abstract, but should be perused in the original. Anyone who faithfully follows the instructions and avoids the pitfalls will stand a good chance of making a correct diagnosis of amoebiasis.

C. A. Hoare

HOOD, Marion, SODEMAN, W. A. & AKENHEAD, W. R. **Comparison of the Effectiveness of the Examination of Multiple Stools and Proctoscopic Material for the Detection of Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 539–42.

The authors report the results of a comparative study of various methods of parasitological diagnosis of amoebiasis carried out in the course of 3 years (1948–51) in New Orleans. The material was provided by 200 patients suffering from gastro-intestinal complaints, who were examined by the following methods : (1) examination of 3 fresh stool specimens in saline and iodine, and by zinc-sulphate concentration ; (2) examination of material obtained by proctoscopy in saline and iodine, and in preparations stained with iron haematoxylin ; and (3) complement fixation.

Since the complement-fixation tests showed no correlation with the other findings, they were used only in 45 cases. It is noted that reliable results by this method are produced only in cases of extra-intestinal amoebiasis, such as hepatic infection, but it fails to reveal intestinal amoebiasis.

Former surveys of amoebiasis among patients in New Orleans by faecal examination revealed an incidence of approximately 4 per cent. In the present study, the use of combined methods raised the incidence to 13 per cent., but there was no evidence of the superiority of any single method.

In addition to *E. histolytica*, the following intestinal protozoa were found (percentage of incidence in brackets) : *E. coli* (5·5), *Endolimax* (7·0), *Iodamoeba* (1·0), *Dientamoeba* (4·0), *Giardia* (2·5), *Chilomastix* (2·0), *Trichomonas* (4·0), *Balantidium* (0·5).

C. A. Hoare

MICHAEL, K. M. M. & COORAY, G. H. **A Culture Method as an Aid for Routine Diagnosis of Amebic Infection in Ceylon.** *Amer. J. Trop. Med. & Hyg.* 1952, July, v. 1, No. 4, 543–7. [10 refs.]

The authors set out to devise a satisfactory cultural method for use in the diagnosis of amoebiasis.

Using only positive stool specimens, containing either trophozoites, or cysts, or both, they compared the growth of *Entamoeba histolytica* in 5 different media : (1) inspissated egg slant covered by Locke's solution with 10 per cent. human serum, without glucose ; (2) inspissated sheep serum slant covered by buffered 0·75 per cent. saline with 10 per cent. human serum ; (3) inspissated human serum slant covered by Ringer's egg-white solution ; (4) St. John's and (5) Balamuth's all-fluid media (the latter without liver concentrate).

In all the semi-solid media, excessive growth of bacteria and *Blastocystis* resulted in poor growth of amoebae, while the fluid media (4 and 5) gave the

highest percentage of positives. But since the results with the last two media were not uniform, trials were made with two combinations of these media : J.B.1 (double strength of St. John's 500 cc., distilled water 470 cc., Balamuth's egg yolk infusion, undiluted and unbuffered, 30 cc.) and J.B.2 (constituents as in J.B.1 but proportions 500, 440 and 60 cc. respectively). The best results were obtained with J.B.1, which promoted growth of amoebae from specimens which failed to grow in (4) and (5) separately.

Tests were then made to ascertain the effect of addition to the 4 liquid media (4, 5, J.B.1, J.B.2) of antibiotics. To tubes, containing 5 cc. of medium, were added 150 units of penicillin salt G (Glaxo), or 1 mgm. streptomycin calcium chloride complex (Glaxo), per cc. of medium, but the latter was not used with (5), as it produced precipitation of the medium. The addition of penicillin increased the number of positive cultures from 68 to 96 per cent. in the different media, whereas the results with streptomycin-treated media were inferior.

Growth in all the antibiotic-treated cultures was at first slow, reaching a maximum (20 or more amoebae per low-power field) after 2–3 days, and declining after 4 days. *C. A. Hoare*

WYSOCKA, Felicja. **Laboratory Diagnosis and Epidemiological Discussion of Four Cases of Amoebic Dysentery.** *Bull. State Inst. Marine & Trop. Med., Gdańsk, Poland.* 1952, v. 4, No. 3, 298–9. [Also in Polish 293–5 & Russian 296–8.]

The four cases described by the author are given as evidence that pathogenic strains of *E. histolytica* can exist in the climate of Poland and survive for years.

The first was in a man of 30 who had been infected in the Ukraine a year earlier, but had lived in north-east Poland for several months recently. *E. histolytica* cysts were found in the stools and t.ophozoites were cultivated on Nelson's medium. *Trichuris* was also present.

The second patient, a man aged 70, had been infected in China 40 years previously. Symptoms had recurred every few years. Stool examinations were negative, but *E. histolytica* was cultivated on Nelson's and on Drbohlav's NNN media.

The third patient, a woman of 29, had been ill with dysentery for 2 years. She lived in west-central Poland and had never been outside the country, nor had she had contacts with persons from endemic areas. Living and housing conditions were good. *E. histolytica* cysts were found in the stools and trophozoites were cultivated on the same two media. After specific treatment there was great improvement, but a clinical relapse occurred in 6 months, when, however, microscopic and cultural examinations proved negative.

The fourth patient, a woman of 37, developed dysentery 7 years before in a camp in Poland where there were persons from Russia and the Mediterranean area : but she had left the camp 6 years ago, and has lived in Poland in good hygienic conditions. *E. histolytica* cysts were found in 3 of 5 samples of stools. From one sample, trophozoites were cultivated on Nelson's medium, and a few on Drbohlav's medium. After treatment, no cysts could be found but trophozoites were cultivated on Drbohlav's NNN and chocolate-coloured NNN media. In this case, *Enterobius* was regularly present also.

H. J. O'D. Burke-Gaffney

RADKE, R. A. **Diagnosis and Treatment of Chronic Amebiasis.** *Southern Med. J.* 1952, Nov., v. 45, No. 11, 1027–34, 4 figs. [12 refs.]

The syndrome of chronic amoebiasis is described as intermittent occurrence of precipitate stools, diarrhoea, and pain in the lower abdomen. The patient is described as being tired, with headache, joint pains and allergic skin manifestations. Physical examination usually reveals tenderness in one or

both lower abdominal quadrants, and hepatomegaly is encountered quite frequently.

By sigmoidoscopy lesions can be demonstrated in more than 80 per cent. and they conform to the usually accepted type. Amoebae are demonstrated from the lesions by an aspiration technique and by culture, for which Alicna's rapid method has proved best in the author's hands. It is stated that cysts have been found in aspirated material, suggesting that they are formed within the intestinal tissues rather than in the bowel lumen [this *Bulletin*, 1951, v. 48, 891].

If lesions are not seen, mucus from the faecal stream should be pipetted from behind each valve of Houston from the rectosigmoidal junction and from the area just above the anal canal.

The author states that the ideal treatment for this condition does not as yet exist. Emetine has been discarded by the author as it does not lend itself to outpatient treatment. Attention was attracted to quinacrine [mepacrine] when given empirically. It is relatively non-toxic. This treatment lasts 15 days, but is not 100 per cent. effective. The best drug in combination with mepacrine is carbarsone. The failure rate of this combination is 15 per cent. Chloroquine, bismuthoxyl glycolylarsanilate (milibis) alone and in combination were tried, but the failure rate was much higher. With aureomycin it was as high as 65 per cent. *Philip Manson-Bahr*

Rodríguez, C. & Adrianza H., M. Complicaciones pleuro-pulmonares de la amibiasis. [**Pleuro-Pulmonary Complications of Amoebiasis**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1950, Jan., v. 2, No. 1, 89–136, 25 figs. [11 refs.]

The English summary appended to the paper is as follows :—

" Ten cases of pleural and pulmonary complications of amebiasis are presented, these were found among a total of one thousand clinical cases of the Thoracic Service at the Instituto Oncológico ' Luis Razetti ' in Caracas, studied during the last two years.

" An increase in the incidence of these complications in the last two years is noted. This increase is interpreted as being due possibly to the limited use of Emetine in the treatment of the acute phase of intestinal amebiasis as well as the almost total disuse of a therapeutic test with this drug in hepatitis with a previous history of intestinal amebiasis.

" The cases reported represent 1% of the total number of histories reviewed. There is a greater incidence among men ; the proportion to females being 10 to 1.

" The pathogenesis of the various pleuro-pulmonary complications of amebiasis is reviewed. These lesions are brought about by the vegetative forms which gain access to the thoracic organs through veins or lymphatics in the vicinity [of] the ' collar button ' ulcers in the colon. A classification of the lesions is proposed into pleural and pulmonary. Each is analyzed individually with reference to the clinical picture symptoms, radiological and laboratory findings, diagnosis and treatment."

Tripodi, P. & Magnanelli, P. Dispepsie gastroduodenali nell'amebiasi cronica. [**Gastroduodenal Involvement in Chronic Amoebiasis**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1952, May, v. 33, No. 5, 259–85. [55 refs.] English summary (5 lines).

At the Rome Hospital for Tropical Diseases, the authors have looked through the records of the 1,116 cases of intestinal amoebiasis which were treated

there in the 10-year period 1941–50. Of every 3 of these patients, approximately 2 had shown signs and symptoms of gastro-duodenal involvement. In all, 396 showed evidence of liver involvement. In 114 cases both gastro-duodenal and hepato-biliary systems seemed to be affected. In 445 cases (40 per cent.) there were gastro-duodenal manifestations but no signs or symptoms of liver disturbance. Thirty-nine cases simulated ulcer of the stomach or duodenum. Gastro-duodenal changes showed up to X-rays in 113 (about 10 per cent.) of all 1,116 cases.

There was a record of the examination of the gastric juice in 23 cases, of which 6 showed hyperchlorhydia, 13 had hypochlorhydia and 4 were normal in this respect.

In addition, the authors have themselves investigated the gastric hydrochloric acid in 28 other patients whom they have been treating at the Hospital for Tropical Diseases. They outline the technique which they have followed for, and tabulate the results of, estimating the hydrochloric acid in the successive samples withdrawn for each test. Ten of these patients showed hyperchlorhydia, 7 hypochlorhydia and 3 achlorhydia ; in the remaining 8 the gastric hydrochloric acid was within the normal limits.

The authors discuss the possible mechanisms of gastro-duodenal involvement in amoebiasis and touch upon prognosis and treatment. They stress the importance of such cases when associated with claims for pension or compensation related to service abroad or other occupational hazards. An amoebic infection may explain, and point to the right line of treatment in, certain gastro-duodenal conditions which had until then proved resistant.

J. Cauchi

Dayrit, C., Vargas, Norma S. & Baltazar, Aida. **Ineffectiveness of Chloroguanide in Amebic Dysentery.** *J. Philippine Med. Ass.* 1952, Sept., v. 28, No. 9, 506–9.

" Chloroguanide, given orally in full and adequate doses for reasonably long periods of time, failed completely in curing any of the 10 cases of amebic dysentery studied.

" The lack of tissue storage of chloroguanide indicates that it probably is also ineffective in extra-intestinal forms of amebiasis."

Muñoz Rivas, G. Coccidiosis y Distomatosis humanas en Colombia. [**Coccidiosis and Distomatosis in Human Beings in Colombia**] *Rev. Facul. de Med.* Bogotá. 1952, Aug., v. 21, No. 2, 47–58, 2 figs. [19 refs.]

An account of 2 cases of *Isospora belli* and 5 of *Fasciola hepatica* seen in Colombia. In the latter case, all 5 infections were in one family. There is a review of the literature and of the special features of the disease.

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Davis, G. E. **Biology as an Aid to the Identification of Two Closely Related Species of Ticks of the Genus** *Ornithodoros*. *J. Parasitology.* 1952, Oct., v. 38, No. 5, 477–80. [13 refs.]

The specific relationship between *Ornithodorus turicata* and *O. parkeri* and their respective relapsing fever spirochaetes has been used to test the identification of ticks from California which had been identified on a morphological basis as *O. turicata*. All these ticks were found to be *O. parkeri* on a biological basis, and it is concluded that *O. turicata* has not yet been shown to be a potential vector of relapsing fever spirochaetes in California. *E. Hindle*

DAVIS, G. E. **Observations on the Biology of the Argasid Tick,** *Ornithodoros brasiliensis* **Aragão, 1923, with the Recovery of a Spirochete,** *Borrelia brasiliensis*, **n. sp.** *J. Parasitology*. 1952, Oct., v. 38, No. 5, 473–6, 1 fig.

The author obtained a supply of *Ornithodorus brasiliensis* from Professor H. de B. ARAGÃO, Rio de Janeiro, and for the first time was successful in rearing this species to the adult stage. Unfed larvae moult to the first nymphal stage about 10 days after hatching. There were from 4 to 7 nymphal stages, and the ticks fed readily on mice within 48 hours after hatching. A spirochaete which causes relapses in white mice was recovered and although relapsing fever has not been recorded from the region where these ticks were collected there are reports of headache, dyspnoea, and a rise in temperature occasionally following tick bite. The author proposes the name *Borrelia* [*Spirochaeta*] *brasiliensis* for this spirochaete normally transmitted by *O. brasiliensis*.

E. Hindle

i. LEVADITI, C., VAISMAN, A. & HAMELIN, A. Les immobilisines anti-récurrentielles (*Borrelia duttoni*). [**Immobilizins against** *Spirochaeta duttoni*] *Ann. Inst. Pasteur*. 1952, Aug., v. 83, No. 2, 256–60.

ii. ——, —— & ——. Les immobilisines actives à l'égard du *Spirochaeta gallinarum*. [**Active Immobilizins concerning** *Spirochaeta gallinarum*] *Ibid.*, 260–62.

i. The authors have examined the immobilizing properties of the sera of mice, rats, guineapigs, and a human patient infected with *Spirochaeta duttoni*. The sera were tested by being mixed with spirochaetes cultured *in vitro*. It was found that in each case immobilizins persisted for long periods, in the mouse up to 157 days before any diminution was observed. The presence of these bodies in the serum is in accordance with the persistence of residual brain infections. Ultra-centrifugalization had little effect on the distribution of immobilizins in the serum.

ii. Similar results to the foregoing were obtained with the sera of fowls which had recovered from infection with *Spirochaeta gallinarum*. The immobilization of the organisms is accompanied by partial lysis.

E. Hindle

LEPROSY

HOLLANDER, A. & SOMMERS, S. C. **Lepromatous Leprosy. Report of a Case observed in Massachusetts.** *New England J. of Med.* 1952, Oct. 23, v. 247, No. 17, 634–5, 1 fig.

"A case of lepromatous leprosy in a thirteen-year-old girl of Greek extraction is described.

"Microscopical examination of scrapings from the nasal mucosa and of smears from excised skin nodules and histologic examination of nodules established the diagnosis. Leprosy bacilli can be demonstrated microscopically in lesions of lepromatous leprosy with the tissue-juice method and subsequent staining by the Ziehl-Neelsen method."

Trespalacios, F. Hospital "San Lázaro" año 1951. Memoria de la dirección técnica. [**Technical Report of the Hospital of San Lazaro, Cuba, for the Year 1951**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba. 1952, Jan.–June, v. 8, No. 1, 43–54.

This leprosy hospital is arranged to hold 250 patients, but the number sometimes mounts up to 400. During the period of the report the numbers were 257 males and 135 females. The patients are classified as to their age, occupation, etc. and the towns and villages in Cuba from which they come. The hospital is well equipped with staff, there being, in addition to the Medical Director, a Surgeon and 4 medical interns, as well as an oculist and dentist. Treatment has been carried out on 295 with diasone, 77 with Avlosulphone (DDS), and 20 with semicarbazone. Avlosulphone has been used for 2 years and, given in doses of 2 or 3 tablets a day without intermission, is found less toxic than other sulphones and has similar therapeutic properties. Semicarbazone has been found useful in cases with neuritis. ACTH caused cessation of lepra reaction in 1 out of 3 cases, but later the reaction returned in a worse form than before.

Ernest Muir

Cochrane, R. G. **The Chemotherapy of Leprosy.** *Brit. Med. J.* 1952, Dec. 6, 1220–23. [13 refs.]

This is a review of the most commonly used sulphones and their action in leprosy. Three main points are discussed: the question whether mono-substituted sulphones are active in themselves [see Floch *et al.*, this *Bulletin*, 1952, v. 49, 158]; whether "certain disubstituted sulphones—for example solapsone—when given parenterally, are broken down to the monosubstituted form"; what are the chemical changes which the parent sulphone undergoes when it is given orally or parenterally. On the second of these points the author questions the statement of Lowe, that the action of solapsone [sulphetrone] is due to DDS being present as an impurity in sufficient quantities to act in a therapeutic dose. "We have recently had several samples of a 50% aqueous solution of solapsone analysed, and have found less than 12 mg. of the parent sulphone per gramme of the solution." [Lowe had stated "it is possible that injections of disubstituted sulphones are therapeutically active, partly because in the solutions before injection, or in the body after injection, mono-substituted sulphones are produced, and these are active", see this *Bulletin*, 1952, v. 49, 629.]

Under "Criteria of Cure" the author concludes: "I believe it is logical to conclude that, because a pre-leproma may take anything from a few months to ten years or more to develop into a full-blown leproma, we may have to wait ten or fifteen years before we can come to any conclusion on the permanency of sulphone 'cures' in leprosy".

Ernest Muir

González Ochoa, A., Martínez Báez, M., Lavalle Aguilar, P. & Castro Estrada, S. Diamino-difenil-sulfona, dihidro-estreptomicina y ácido para-amino-salicílico, en el tratamiento de la lepra lepromatosa. [**Diamino-Diphenyl-Sulphone, Dihydro-streptomycin and Para-Amino-Salicylic Acid in the Treatment of Lepromatous Leprosy**] *Bol. Oficina Sanitaria Panamericana.* 1952, Oct., v. 33, No. 4, 306–29, 10 figs. [19 refs.] English summary.

The authors treated 21 patients for 6 months, dividing them into 4 groups. In the first group, 6 patients were given DDS in daily divided doses of 100 mgm.; in the second, 6 patients were given dihydrostreptomycin intra-muscularly

(1·5 gm. every other day) and PAS 4 gm. by mouth after each meal ; the third group of 5 patients were given these 3 drugs in the same doses and at the same intervals ; the fourth group were given only PAS, 12 gm. daily.

Thirteen of the patients received DDS for an additional 6 months.

Of the 3 drugs used, DDS was by far the most effective. There was no evident synergic effect. Dihydrostreptomycin was considered useful during severe attacks of lepra reaction, but PAS was not recommended for use in leprosy. *Ernest Muir*

Floch, H., Lecuiller, A. & Sureau, P. Mode d'action des sulfones dans la lèpre (VII). Comment agit la diamino-diphényl-sulfone-actéylsulfonamide administrée par la voie buccale dans le traitement de la lèpre. [**Mode of Action of Sulphones in Leprosy (VII). Action of Diamino-Diphenyl Sulphone Acetylsulphonamide when given Orally in the Treatment of Leprosy**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 263.* 1952, June, 6 pp. [12 refs.]

This substance, with the trade name of Promacetin, is characterized by its slight toxicity, which is due perhaps to its not being transformed into DDS in the body. This stability was shown by comparing the blood and urine concentrations when the drug was given hydrolysed with the concentrations when it was given without hydrolysation, the concentrations being the same. It was found that after a dose of 4 gm. of Promacetin 75 per cent. could be recovered in the stools, only 25 per cent. being absorbed into the blood stream.

Even boiling in normal hydrochloric acid on a water-bath for an hour, and evaporating to dryness did not increase the toxicity of Promacetin when injected into mice. Promacetin, although of slight toxicity, has an action *in vitro* 20 times inferior to that of DDS. When the two are compared, the practical facts are in favour of the latter. *Ernest Muir*

Floch, H. & Lecuiller, A. Mode d'action des sulfones dans la lèpre (VIII). Ce que devient la diamino-diphényl-sulfone administrée expérimentalement à des cobayes. [**The Mode of Action of Sulphones in Leprosy (VIII). What becomes of Diamino-Diphenyl Sulphone administered Experimentally to Guineapigs**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 264.* 1952, June, 6 pp.

The authors are accustomed to give 200 mgm. of DDS by mouth daily for 6 days a week [an amount considerably in excess of that now recommended by many workers], but they consider that this dosage causes a gradual accumulation in the body which may be dangerous. They have therefore been accustomed to give a day's rest each week and a week's rest every two months. The present experiments were to test to what extent sulphones accumulate in the tissues.

Trials showed that with guineapigs a single oral dose of 0·3 gm. per kilo. of DDS produced 50 per cent. mortality. When 100 mgm. were given to a guineapig twice each week for 42 doses there was, principally in the liver and kidneys, a concentration of 23·9 and 21·5 mgm. per cent.

These experiments are considered by the authors to justify a therapeutic rest of one day a week and one week in 2 months. *Ernest Muir*

Knorr, R. Die Behandlung der Lepra mit Conteben. [**Conteben in the Treatment of Leprosy**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Oct., v. 4, No. 1, 31–7.

Since October 1950 ten leprosy patients, 7 of the lepromatous form and 3 of the tuberculoid, have been treated with Conteben in an Addis Ababa hospital.

Details of each of the patients are given and the results have been remarkably good and improvement was observed to set in earlier than with sulphone treatment. The usual initial dosage was 0·025 gm. daily, increasing in 4 weeks to 0·2 gm. Ulcers became cleaner, lepromata flatter and general well-being marked. Larger doses sometimes brought about a lepra reaction and the dosage had to be reduced. Conteben seemed not to prevent the appearance of fresh lepromata during such reaction. Apart from these reactions which could be avoided by careful dosage, the improvement was continuous and within 12 to 16 months practically all the signs had cleared and no bacilli were seen in nasal smears, though they could still be found in the skin. Mucous membrane ulcers were healing and becoming epithelialized in 3 months, sensation was returning in anaesthetic areas but this was usually longer delayed than improvement in the grosser lesions. *H. Harold Scott*

Floch, H. & Sureau, P. Action d'une thiosemicarbazone (corps G. 469) dans la lèpre [**The Action of a Thiosemicarbazone (G. 469) in Leprosy**] *Arch. Inst. Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 265.* 1952, June, 10 pp.

This substance (β pyridine aldehyde thiosemicarbazone) was tried in 8 patients who had been previously treated with sulphones and other drugs. The dosage given was much larger than that tolerated with TB-1, namely 500 and 600 mgm. daily by mouth. Most of the patients interrupted the treatment because of reactions, gastro-intestinal irritation, &c. The authors are of the opinion that G.469 is undoubtedly active against Hansen's bacillus, and is not inferior to TB-1 at 200 mgm. a day. They think that G.469 with smaller dosage might be better tolerated and yet effective in leprosy. *Ernest Muir*

Allday, E. J. & Barnes, J. **Treatment of Leprosy with B.283.** *Irish J. Med. Sci.* 1952, Oct., 6th Ser., No. 322, 421–5, 3 figs. on 3 pls.

Ten leprosy patients were treated with the phenazine dye B.283 (2-anilino-3-imino-5-phenyl phenazine) following on its use in inhibiting *Myco. tuberculosis*. The patients were adult lepromatous cases and they were treated for a year. Of the 10, there were bacteriologically negative results obtained in 3. There was clinical improvement even in the first 3 months, with nodules flattening and thickened skin becoming thinner. Difficulty was experienced because of the proneness of the patients in that region to hepatic infections. The dose of B.283 had to be reduced from 750 to 500 mgm. daily. The authors consider that a case has been made out for further trial. *Ernest Muir*

HELMINTHIASIS

Wetzel, R. Helminthen und Immunität. [**Helminths and Immunity**] *Zent. f. Bakt.* 1. Abt. Orig. 1952, June 30, v. 158, Nos. 3/5, 199–205. [23 refs.]

This paper discusses modern views concerning the development in the vertebrate host of immunity to certain helminth infestations, and the association of such immunity with various serological tests, similar to those commonly employed for the recognition of infections due to viruses, bacteria and protozoa. Attention is drawn to the fact that whereas immunity to viruses, bacteria or protozoa develops as the result of the multiplication of these parasites in the bodies of their hosts, development of immunity to helminth infections is

usually obtained only after repeated invasions from outside sources. It is also pointed out that resistance or immunity to certain helminth parasites is probably the result of the formation of antibodies developed by the presence of antigens occurring in the secretions and excretions of the parasitic worms and that our study of these is hampered because, up to date, all attempts to culture parasitic worms *in vitro* have failed. *R. M. Gordon*

WATSON, J. M. **Studies on Bilharziasis in Iraq. Part VII. Further Observations on Incidence in the City of Baghdad.** *J. Faculty of Med., Baghdad, Iraq.* 1952, v. 16, No. 1, 1–24, 1 map.

Urine samples were examined for *S. haematobium* eggs in two important groups of the Baghdad population, namely, schoolboys and dwellers (males only) in the mud-hut settlements on the outskirts of the city. Of 537 examined, 182 (34 per cent.) were positive [there is some discrepancy between these totals and those in the tables]. The incidence in the schoolboys were 25 per cent. and in the hut dwellers, 46 per cent. Age-group analysis of the figures showed the highest incidence to be in the 11–20 age-group, those between the ages of 16 and 20 having the maximum incidence. Occupational groups most heavily infected were labourers (agricultural and others), herdsman and fisherman, but the evidence points to the disease being a social rather than an occupational one, since the poorer classes are often necessarily exposed to infection when washing, bathing and drinking.

Bulinus truncatus was found in irrigation channels, swamps, culvert-heads, swamps developed from borrow-pits, drains and pools in the city and its suburbs. Most of the snail colonies were on the east bank of the Tigris where the incidence of the disease was slightly higher than on the west, but it was not possible to correlate exactly the incidence of the disease with the occurrence of snail colonies.

Evidence is adduced to show that the disease is increasing in the city dwellers and this is thought to be due to the great increase in the snail population and the number of suitable habitats which have been provided for them as the result of extended irrigation schemes, bund construction and brick manufacture.

The paper concludes with a comprehensive list of proposals for control measures, which should be adopted to prevent further increase of the disease. *J. J. C. Buckley*

STIREWALT, M. A. & EVANS, A. S. **Demonstration of an Enzymatic Factor in Cercariae of *Schistosoma mansoni* by the Streptococcal Decapsulation Test.** *J. Infect. Dis.* 1952, Sept.–Oct., v. 91, No. 2, 191–7, 5 figs.

It has been reported previously that hyaluronidase is present in cercariae of *S. mansoni*, as shown by reduction in viscosity of hyaluronic acid, but doubt has been cast on the validity of the procedures used in proof of this statement. The present authors have sought a more sensitive method to demonstrate the presence of hyaluronidase in the same parasite by making use of the streptococcal decapsulation test. Thus it is known that one of the chief components of the capsules of Group C mucoid β-haemolytic streptococci is hyaluronic acid which is depolymerized and made to disappear by enzymes of hyaluronidase type. This test has been adapted for qualitative determination of the presence of the enzyme in *S. mansoni* in the present study.

Cercariae were obtained from about 100 infected snails and after washing were collected in a volume of approximately 1 ml. In one type of preparation they were ground in the fresh state or alternatively were extracted in the cold for several days after drying and grinding. The suspension or extract was allowed to act on the cultured streptococci and suitable controls with bacteria

present in snail faeces were also used. Incubation on sodium hyaluronate markedly increased enzyme production of the latter but not that of cercariae. It was found that both types of cercarial preparation reduced the capsular zone of the Group C streptococci rapidly as compared with controls and the action resembled that of a hyaluronidase of bull testes. The cercarial preparations were heat-labile, being inactivated by heating for 1 hour at 56°C.

J. D. Fulton

BUEDING, E. **Acetylcholinesterase Activity of** *Schistosoma mansoni*. *Brit. J. Pharmacol. & Chemotherapy*. 1952, Dec., v. 7, No. 4, 563–6, 1 fig. [11 refs.]

" The trematode, *Schistosoma mansoni*, contains a specific acetylcholinesterase. Its concentration in the parasite is of the same order of magnitude as that of mammalian brain. Some properties of this enzyme are described and compared with acetylcholinesterases from other species."

[See also this *Bulletin*, 1950, v. 47, 119.]

NEWTON, W. L. **The Comparative Tissue Reaction of Two Strains of** *Australorbis glabratus* **to Infection with** *Schistosoma mansoni*. *J. Parasitology*. 1952, Aug., v. 38, No. 4, Sect. 1, 362–6, 6 figs. on pl.

" A study of sections of 50 snails of a Puerto Rican and a Brazilian strain of *Australorbis glabratus* revealed differences which account, in part, for the failure to infect the latter strain with a Puerto Rican strain of *Schistosoma mansoni*. In the susceptible Puerto Rican strain, the parasite develops apparently without any effective interference on the part of the snail. In contrast, in the Brazilian strain the parasite is destroyed and removed, usually within 24 to 48 hours after penetration. As at least a part of this response, there is a marked cellular infiltration around the parasite. A fibrotic type of walling-off reaction also appears to be characteristic of this response."

PEÑALVER, L. M. Infección experimental de moluscos fluviales cubanos con *Schistosoma mansoni*. [**Experimental Infection of Cuban Fresh-Water Snails by** *S. mansoni*] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1950, Jan., v. 2, No. 1, 297–308, 5 figs. [13 refs.]

The English summary appended to the paper is as follows :—

" With the purpose of determining the potential capacity of the fresh-water mollusca of Cuba as intermediate hosts of *Schistosoma mansoni*, groups of six species of snails : *Helisoma caribaeus, Tropicorbis havanensis, Physa cubensis, Lymnaea cubensis, Marusa cornuspira* and *Pomacea paludosa* were exposed to miracidian infection.

" In a total of 328 snails exposed individually and in groups no one case of evolution of *Schistosoma mansoni* was positive. Produced also negative infection the species of *Tropicorbis havanensis* and *Pomacea paludosa* considered by some authors as experimental hosts.

" In some samples of *Tropicorbis havanensis, Physa cubensis, Lymnaea cubensis* and *Helisoma caribaeus* was observed miracidian attraction and penetration but no evolution to sporocysts and cercariae."

DELAHOUSSE, J. Fréquence et gravité des complications hépatiques et spléniques de la bilharziose intestinale dans un centre de cultures irriguées au Soudan Français. [**Frequency and Severity of Hepatic and Splenic Complications in Intestinal Schistosomiasis in an Irrigated Agricultural Area in the French Sudan**] *Méd. Trop.* Marseilles. 1952, Sept.–Oct., v. 12, No. 5, 532–5. [11 refs.]

Baguineda in the French Sudan is an agricultural area inhabited by 6,000 persons, congregated in about 15 villages which are grouped near the Niger

River. It is well irrigated by a network of canals, and the principal crops are cotton and rice. In the canals, and in permanent pools, *Planorbis adowensis* is found plentifully ; and from these snails mice have been experimentally infected with *Schistosoma mansoni*. Of the 6,000 inhabitants of the area 2,700 are children aged less than 14 years. The spleen index of those under 6 years of age is 90 per cent. ; it then progressively falls until it is 40 per cent. in the older children. Neither diarrhoea nor dysentery is unusually common in this community, but the number of children with distended abdomens and oedema of the legs is striking, especially in those over 8 years of age ; 370 of the 2,700 children had clinical evidence of cirrhosis.

Two stages of severity of the manifestations are evident. In the preponderating earlier stage there is enlargement of the spleen and the liver, without oedema or ascites, and anaemia. In the much more rare later stage there is evidence of marked cirrhosis first with oedema and later with anasarca ; the patient is gravely ill, the liver and spleen become grossly enlarged, and the patient commonly dies. From 80 per cent. of the 370 children schistosomal eggs were recovered from the stools ; 19 times out of 20 the eggs were those of *S. mansoni*, but in the 20th they were terminal-spined eggs although there was no clinical evidence of vesical schistosomiasis in the area.

Where possible intravenous treatment with tartar emetic was given ; failing this anthiomaline was used ; infants were treated with emetine. The treatments were repeated at 3-month intervals, and the clinical results were encouraging.

The author points out that the changes resultant on the implementation of schemes for public works, such as irrigation, often create new epidemiological problems. *A. R. D. Adams*

GALAL, O. **Ligature of the Splenic Artery in Egyptian Splenomegaly.** *J. Roy. Egyptian Med. Ass.* 1952, v. 35, Nos. 9/10, 634–44. [11 refs.]

In many cases of Egyptian splenomegaly fibrosis of the spleen is accompanied by perisplenitis, which leads to the formation of adhesions ; these are found mainly on the under surface of the diaphragm and in the neighbourhood of the lieno-renal ligament, involving the omentum. The adhesions may be (*a*) light and easily separable at operation with little bleeding, or (*b*) they may be in process of organization requiring some force to break them down with considerable haemorrhage when torn, or (*c*) they may be organized and scattered over a wide area, so that splenectomy may involve severe haemorrhage resulting in death in a high percentage of cases. Such haemorrhage may be rapid and profuse when coming from large vessels torn during separation of adhesions, or may be a generalized capillary oozing from the whole splenic bed. Thus a proportion of patients with adhesions of type (*b*) and all with adhesions of type (*c*) should be classed as unsuitable for splenectomy ; in such cases ligature of the splenic artery may be a useful alternative.

The abdomen is opened under spinal anaesthesia by a left paramedian supra-umbilical incision and the spleen examined to determine whether the extent of the adhesions justifies splenectomy or is a contraindication, a decision which in some cases may be made pre-operatively based on the much reduced mobility of the spleen on respiration. If splenectomy is contraindicated an opening is made into the lesser sac through the great omentum below the greater curvature of the stomach and the splenic artery is ligatured in the interval between the point of emergence of the left gastro-epiploic artery and the first of the short gastric arteries. The artery lies at the upper border of the left end of the body of the pancreas, with the splenic vein behind and beneath it. The artery is tied in two places with No. 5 silk twist, the opening in the

omentum closed with a continuous catgut suture and the abdomen closed. The spleen immediately becomes darker and more compressible. Omental adhesions may obstruct the approach and have to be divided, distension of the stomach may necessitate the use of the stomach tube and isolated masses of lymphoid tissue in the region of the hilum with a multiplicity of adventitious vessels may render the operation difficult.

After the operation the congestion and heaviness of the spleen will be diminished and the reduction of the blood return in the splenic vein will relieve the portal system in the liver ; the flaccid spleen no longer weighs heavily in the patient's hypochondrium and the dyspepsia caused by the drag of the spleen on the stomach is relieved. Three cases treated by this method are reported, but, though the patients' condition improved subjectively after operation, the spleen did not diminish in size and the late results have still to be investigated.

[Ligature of the splenic artery is one of the operations now employed in the treatment of cirrhosis of the liver and Banti's disease when porto-caval or other shunt operations are impracticable ; its object is to reduce the amount of blood entering the portal system.] *W. L. Harnett*

HUNTER, G. W., RITCHIE, L. S. & OTORI, Y. **A Comparison of the Infectivity of *Schistosoma japonicum* occurring in Japan for *Oncomelania nosophora* and *Oncomelania formosana*.** [Research Notes.] *J. Parasitology*. 1952, Oct., v. 38, No. 5, 492.

The authors refer to the varying infectivity of *S. mansoni* from different areas for specific snail hosts, and quote from the literature. The present study was designed to determine if these differences occur with *S. japonicum* and its hosts *O. nosophora* and *O. formosana*. Both snails were exposed simultaneously to miracidia of *S. japonicum* autochthonous to Japan. Exposures were made with 1 or with 10 miracidia. When 10 miracidia were used, the snails were dissected before the mother sporocysts lost their identity : when a single miracidium was employed, time was allowed for infection to reach maturity.

The results are shown in detail in a table, which indicates that of 128 surviving *O. nosophora* exposed to 1 miracidium, 12 (9·4 per cent.) were infected, but not a single infection occurred with 194 *O. formosana*. When 10 miracidia were used, 52 (44·4 per cent.) of 117 surviving *O. nosophora* were infected with a total of 77 mother sporocysts, representing 6·6 per cent. of the miracidia used. Only one of 126 *O. formosana* was infected, and this was probably an experimental one (a preliminary check by sample crushing had been made and the infection was of the same age as those in *O. nosophora*).

It would seem that *O. formosana* is not a suitable host for Japanese forms of *S. japonicum*, indicating a strain difference between *S. japonicum* in Japan and in Formosa. *H. J. O'D. Burke-Gaffney*

OLIVIER, L. **A Comparison of Infections in Mice with Three Species of Schistosomes, *Schistosoma mansoni*, *Schistosoma japonicum* and *Schistosomatium douthitti*.** *Amer. J. Hyg.* 1952, Jan., v. 55, No. 1, 22–35, 4 figs. & 1 pl. [13 refs.]

Olivier, exposing mice to known numbers of cercariae of *Schistosoma mansoni*, *S. japonicum* and *Schistosomatium douthitti*, observed the lung damage caused by the migration of these parasites through the lungs. Although the investigation was primarily planned to gather quantitative data on the production of the pulmonary lesions caused by these three species, he also collected data on the numbers of worms recovered at different intervals from the portal system and

on the time of arrival and early growth of the parasites after reaching the portal circulation. He describes in detail his technique of examining the lungs for lesions and worms and collecting the worms from the portal system. Various tables record the number of pulmonary haemorrhages and worm counts at various intervals per mouse from animals exposed to definite numbers of cercariae of the different species.

S. japonicum and *S. douthitti* produced numerous pulmonary haemorrhages even when the exposure to cercariae was only 100 cercariae per mouse. Many mice showed over 50 haemorrhages from the 3rd to the 6th day after exposure. This indicates rapid transit of the worms to the lungs and probably rapid passage through these organs. The haemorrhages persisted for approximately only 3 to 4 days. The number of haemorrhages in *S. mansoni* infection was always small and it is probable that a mouse receiving 200 cercariae develops only few pulmonary haemorrhages, indicating that little damage is done to the lung. Passage through the lungs in the case of *S. mansoni* was slow. A great percentage of the cercariae of *S. japonicum* and *S. douthitti* reached the portal system, but only a very low proportion of the *S. mansoni* cercariae did so.

It is suggested that the behaviour of *S. mansoni* in the lungs and their slow passage to the portal system is due to an abnormal host exposure. The other two species are highly successful parasites of mice and rats, do not accumulate in the lungs and reach the portal circulation without delay. *P. L. LeRoux*

See also p. 202, Pifano C. & Marcuzzi, Investigaciones histopatológicas sobre el miocardio de ratones blancos infectados experimentalmente con *Schizotrypanum cruzi* y *Schistosoma mansoni*, sometidos a dietas carentes en Vitamina B_1 y Factor PP. [**Histopathological Studies on the Myocardium of White Rats Experimentally Infected with** *T. cruzi* **and** *S. mansoni* **on Diets Deficient in Vitamin B_1 and PP Factor**]

See also p. 218, Muñoz Rivas, Coccidiosis y Distomatosis humanas en Colombia. [**Coccidiosis and Distomatosis in Human Beings in Colombia**]

Daugherty, J. W. **Intermediary Protein Metabolism in Helminths. I. Transaminase Reactions in** *Fasciola hepatica*. *Exper. Parasit.* New York. 1952, Nov., v. 1, No. 4, 331–8. [13 refs.]

"1. An application of new techniques involving filter paper chromatography was made to a quantitative study of the transaminase systems in *Fasciola hepatica*.

"2. Studies were made of the α-ketoglutaric-glutamic acid transaminase reaction with various amino acids as amino group donors. Aspartic acid, isoleucine, leucine, and valine yielded high transaminase activity. Arginine, alanine, phenylalanine, tyrosine, methionine, and proline gave moderate to weak results. Results with tryptophan were questionable. Lysine and cystine produced no activity.

"3. Pyridoxal phosphate was shown to enhance transaminase activity with valine, alanine, phenylalanine, methionine and proline although the extent of this enhancement varied with the different amino acids.

"4. A brief comparison was made between the transamination reactions in *Fasciola* and those of other tissues."

Chavarría Ch., M. La cisticercosis como problema de salubridad pública en México. [**Cysticercosis as a Public Health Problem in Mexico**] *Bol. Oficina Sanitaria Panamericana*. 1952, Nov., v. 33, No. 5, 394–404.

Cysticercosis is far more rife than it should be, or be permitted to be, in Mexico. There are several contributary reasons for this : general sanitation is poor,

food-handlers do not wash their hands, cooking is inadequate, pigs are reared under bad conditions—they wander freely in and about the houses, root about in deposits of human dejecta—waste-water is uncontrolled and undrained and meat inspection is often perfunctory. Infection of pigs cannot be estimated very accurately even by slaughterhouse records, for the infected are kept back and not accepted by buyers and are slaughtered privately or in places where there is no inspection of meat, while, even where there is inspection, slight infection may be overlooked.

The author gives in tables the results of inspection of pigs in 45 localities in 19 States ; the proportions naturally vary considerably both as regards totals examined and numbers found positive, but the average in the States is about 10 per cent. Also, among 736,937 pigs examined at 18 slaughterhouses, 92,774 were found infected, or 12·58 per cent.

To remedy all this there does not seem to be any need to make fresh regulations, but it is essential to see that the regulations already in force should be properly and energetically carried out, particularly those dealing with slaughterhouse hygiene, adequate inspection, clean handling of meat and, of course, proper cooking, and education of the people. *H. Harold Scott*

Hussey, K. L., Shookhoff, H. B. & Sterman, M. M. **An Anomalous Tapeworm from Man.** *J. Parasitology.* 1952, Aug., v. 38, No. 4, Sect. 1, 305–7, 3 figs.

A 39-year-old woman of Mexico had been passing tapeworm fragments at intervals of 2–3 years over a period of 15 years, and in the last 3 years, at intervals of 3–6 months. Evidence of the infection first appeared after she had been eating almost raw beef as a course of treatment for anaemia. No eggs were found in the stools. Blood examination revealed : haemoglobin, 15·2 gm. per 100 cc. ; red blood cells, 4,900,000 per cmm. ; white blood cells, 10,850 per cmm. ; neutrophiles, 50 per cent. ; eosinophiles, 2 per cent. ; lymphocytes, 36 per cent. ; monocytes 7 per cent. Positive results were obtained from intradermal tests with *Dipylidium caninum* antigen and human hydatid fluid antigen, and by complement-fixation reaction with *Echinococcus* antigen.

One portion of the worm which was passed was 27 inches long. Further lengths were obtained after treatment with atebrin [mepacrine] followed by 50 per cent. solution of magnesium sulphate. The morphology of the worm, of which the scolex was not recovered, was peculiar in that no external or internal segmentation was visible and genital pores were absent. Well-developed testes were present in some parts of the worm but no trace of ovarian tissue was found. Uterine branches, having an irregular arrangement, were present but contained no eggs. The specimen is believed to be a *Taenia*, probably *T. saginata.*

J. J. C. Buckley

Read, C. P. **Contributions to Cestode Enzymology. I. The Cytochrome System and Succinic Dehydrogenase in** *Hymenolepis diminuta.* *Exper. Parasit.* New York. 1952, Nov., v. 1, No. 4, 353–62, 1 fig. [26 refs.]

Naumann, P. Beitrag zur Echinokokkenerkrankung des Menschen. [**Hydatid Disease in Man**] *Deut. Gesundheitswesen.* 1952, Nov. 5, v. 7, No. 45, 1418–21, 3 figs. [13 refs.]

The occurrence of a case of hydatid disease, which is a rare condition in central Germany, was the stimulus for writing this article on the epidemiology, diagnosis, clinical course, treatment and prophylaxis of *Echinococcus* infestation.

The patient, a man aged 56 years, was thought at first to be suffering from a basal pleurisy but X-ray examination resulted in the diagnosis of hydatid of

the liver. Materials for the skin and complement-fixation tests were not then available but after operation the tests could be performed and were positive.

The operation, which was completely successful, is described and the appearance of the calcified hydatid cyst is illustrated. Various operations which have been undertaken for removal of such cysts are discussed.

The personal history of the patient suggests that the infestation may have occurred near Rheims during the First World War when he, serving in the sanitary service, had to catch stray dogs which then became welcome additions to the diet of the troops. *M. E. Delafield*

GHANEM, M. H. & DARWISH, A. E. **Hydatid Heart Disease with Paroxysmal Tachycardia.** *Brit. Heart J.* 1951, Jan., v. 13, No. 1, 109–11, 1 fig.

WEINSTEIN, P. P. **Regulation of Water Balance as a Function of the Excretory System of the Filariform Larvae of** *Nippostrongylus muris* **and** *Ancylostoma caninum*. *Exper. Parasit.* New York. 1952, Nov., v. 1, No. 4, 363–76, 3 figs. [19 refs.]

BEAVER, P. C. **Observations on the Epidemiology of Ascariasis in a Region of High Hookworm Endemicity.** *J. Parasitology.* 1952, Oct., v. 38, No. 5, 445–53, 2 figs. [27 refs.]

"1. To determine some of the factors responsible for the low incidence of ascariasis in a region of high hookworm endemicity, observations were made on 50 ascaris-infected families, on the infectivity of dooryard soil, the rate and level of ascaris infection in pigs, and the rate of development, survival and distribution of eggs in the sandy soils of the lower coastal plain of southeastern Georgia.

"2. The ascaris-infected families were found to be typical also of the hookworm-infected families of the same region.

"3. Viable ascaris eggs, usually some with motile larvae, were found in the dooryards of all infected families, but during the dry season they were relatively scarce and were found only in a narrow zone around the entranceways where dampness was maintained by household refuse.

"4. Ascaris infections in pigs were lighter and less frequent in the study area than in a neighboring area where denser soils predominate.

"5. In 4 experimentally inoculated plots, ascaris eggs developed more rapidly and survived better in shaded soil containing clay than in shaded sandy soil. Survival was poor in sandy soils exposed either to morning or afternoon sun. Ninety days after inoculation, eggs containing motile larvae were found with difficulty or not at all in the sandy plots but were numerous, though markedly reduced, in the clay plot.

"6. Due to splashing of raindrops, eggs were transported laterally at least 1·5 meters in 20 days and were deposited on vertical surfaces of boards and vegetation up to 30 cm. above the ground.

"7. The sorting action of raindrops concentrated the eggs in the topmost stratum of the sandy soils but in clay they were buried under a protective layer of fine colloidal particles.

"8. Low endemicity of *Ascaris lumbricoides* in the coastal plain of southeastern Georgia apparently is due chiefly to the sandy character of the topsoil which, in contrast to clay, does not contain sufficient light colloidal elements to retain surface moisture and to stratify the eggs just below the ground surface where they are protected against desiccation and direct sunlight, and at the same time are advantageously situated for transfer to new hosts."

JETTMAR, H. M. Über die bakteriostatische Wirkung der Askariden-Cuticula. [**The Bacteriostatic Effect of *Ascaris* Cuticle**] *Arch. f. Hyg. u. Bakt.* 1952, v. 136, No. 8, 568–73.

The English summary appended to the paper is as follows :—

" The bacteriostatical properties of different organs of Ascaris megalocephala were examined. Besides of the fluid of the Pericoel which possesses the highest titre, suspensions of the cuticula of the worm inhibit as well growth of a number of gram-positive microorganisms. These substances show a considerable thermostability."

JELLIFFE, D. B. *Ascaris lumbricoides* **presenting through the Umbilicus.** *West African Med. J.* 1952, Oct.–Nov.–Dec., v. 1 (n.s.), No. 4, 183–4, 2 figs.

" Ascaris lumbricoides has on rare occasions been reported to have appeared through an umbilical fistula, as, for example, by CHANCO (1938) in the Philippines.

" In the present case, it would seem possible that treatment with oil of chenopodium may have stimulated a roundworm either to have penetrated the intestinal wall or to have entered and blocked a persistent and patent Meckel's diverticulum (omphalomesenteric duct). In either case, a localised inflammatory lesion was produced with the formation of an abscess which pointed at the umbilicus."

FRANK, A. & PAUL, K. Über gehäuftes Auftreten flüchtiger eosinophiler Lungeninfiltrate mit Ascaris-Genese in einer Lungenheilstätte. [**Transient Pulmonary Eosinophilia with developing *Ascaris* in a Hospital**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Oct., v. 4, No. 1, 64–77, 8 figs [21 refs.]

During a period of 18 days the authors had under their observation in a tuberculosis hospital in the Austrian Tyrol a series of 9 patients with transient eosinophilic pulmonary infiltration. They were able to correlate the course of the condition by a series of X-ray photographs, by clinical and haematological examinations and, as they say, finally to determine the cause, when *Ascaris* developed in the bowel. Details are given of 8 of the patients. Leucocyte counts in the blood ranged between 9,000 and 15,000 per cmm. and eosinophiles from 8·8 to 46 per cent. X-rays showed mottling of the lungs and there was a dry bronchitic cough. In the lung infiltrate eosinophiles were found up to 1,400 per cmm. and this infiltration lasted up to 12 days, though it might be a month before the eosinophilia disappeared. The general state of the patients was but little affected ; 3 showed no change at all, 3 others had a rise of temperature to 38·5°C. lasting for 2 days and, after a few days subnormal, returning to normal within 8 days ; 4 others had a subnormal temperature for 3 to 10 days. Fine crepitations might be heard in the lungs, unchanged by coughing ; mucopurulent expectoration was present, but not in large amount, up to 15 cc., of canary-yellow colour in 3 patients. No larvae were seen, nor any Charcot-Leyden crystals, nor could the source of infection be discovered. [It is well known that *Ascaris* undergoes part of its development in the lungs and it is highly probable that the larvae were the cause of the eosinophilia and the lung condition here described, but the crucial link is missing—no larvae were seen in the sputum.] *H. Harold Scott*

HUECK, O. *Wuchereria bancrofti* in Tungkun (Cantonprovinz). [*W. bancrofti* **in Tungkun, China**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Oct., v. 4, No. 1, 124–7.

The English summary appended to the paper is as follows : —

" This is a report on Wuchereria bancrofti infections as observed among patients of Tungkun Hospital, Southern China. From 1940 to 1950, 36 cases of chyluria and 4 cases of elephantiasis were seen. The high rate of chyluria is remarkable compared to other filarial complications. Accidental findings of microfilariae without clinical symptoms are not unfrequent."

MANSON-BAHR, P. **The Clinical Manifestations and Ecology of Pacific Filariasis.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, Sept., v. 4, No. 3, 193–204, 1 diagram. [33 refs.]

This paper is a record and summing up of the work on filariasis carried out in Fiji by Sir Philip Manson-Bahr in his early days as a beginner in Tropical Medicine and 40 years later after his retirement from the active staff of the London School of Tropical Medicine. In the introduction he reiterates his long-standing belief that the nocturnal periodic and the non-periodic forms of filariasis in the Pacific are produced by adult filariae differing in their preference for certain insect vectors and in certain identifiable morphological characters, and that the clinical phenomena evoked by them are dissimilar in some respects.

He maintains that the two closely related filariae should henceforth be distinguished as *W. bancrofti* producing nocturnal periodic microfilariae and as *W. pacifica* giving rise to non-periodic embryos respectively.

He emphasizes BUXTON'S delineation of the boundaries of the areas in the Pacific in which these two forms of filariasis are found and confirms the presence in great density of the non-periodic form in Fiji and Samoa in contrast to the overwhelming predominance of the nocturnal periodic form in Melanesia and Micronesia. The insect vectors of the two forms differ in their morphology, habits and association with man. The main vector of *W. pacifica* is *Aëdes scutellaris polynesiensis*. In Melanesia and Micronesia night-biting *Culex fatigans* and *Anopheles punctulatus farauti* carry the periodic filaria infections.

Sir Philip accepts and restates the classification of signs and symptoms of filariasis suggested by his son Dr. Clinton Manson-Bahr, namely :

1. The primary or allergic state with brief periods of minor illness commencing 7–9 months after exposure to infection.
2. The secondary stage with sexually mature adults in the lymph glands and with microfilariae in the blood.
3. The tertiary stage with obstruction to the lymph circulation, stasis, granulation and finally with the development of elephantiasis.

In a series of tables he shows the relation of the microfilaria rate to the generally accepted signs and symptoms of filariasis. In these the microfilaria and elephantiasis rates in Fiji, British Guiana and South India are compared and contrasted. He draws the conclusion that the nocturnal form caused by *W. bancrofti* is an urban or house infection more readily controlled by sanitary measures. On the other hand the non-periodic form associated with *W. pacifica* is a rural infection contracted in the daytime from mosquitoes which live in gardens and plantations where men work. It is accordingly difficult to eradicate.

The distinctive features of nocturnal periodic filariasis are lymphuria, chyluria, elephantiasis of the legs, and those of non-periodic filariasis are gross enlargement of epitrochlear glands, elephantiasis of the arms and breasts.

It appears rational to hypothesize as follows :—The location of the adult filariae in the body is dependent on the point of entry. The pathological

lesions are dependent on the exact location of the adult filariae. The clinical phenomena are dependent on the number of invading filariae and the space of time over which they are inoculated into the human body. The ultimate result of hyperfilariation is elephantiasis.

There is a very complete list of references. *G. R. McRobert*

SCHOBINGER VON SCHOWINGEN, R. **Further Experiences in the Treatment of Filariasis with Hetrazan.** [Miscellanea.] *Acta Tropica.* Basle. 1952, v. 9, No. 3, 270–71.

The present work was undertaken in order to determine the effects of higher doses of hetrazan given over a shorter period than in the scheme adopted by SANTIAGO-STEVENSON, OLIVER-GONZÁLEZ and HEWITT [this *Bulletin*, 1948, v. 45, 353].

Seventeen Porto Ricans (15 males and 2 females) with filariasis bancrofti were admitted to hospital. In the first group of 5 hetrazan was administered in doses of 2 mgm./kgm. three times daily. The duration of treatment was for 10 days in 3 patients and for the 2 others 14 and 21 days. Therapeutic results varied : in 4 the blood films were negative on the following day, but in the fifth the microfilariae persisted for three months and then disappeared. Allergic reactions were mild.

In the second group of 5 the dose was 3 mgm./kgm. three times daily, in 2 for 7 days, in the other 3 during 3–10 days. The allergic and toxic reactions were more severe in 2, but did not require interruption of treatment. Four patients with 7–10 days of treatment remained negative. In one treated for 3 days the microfilariae remained unchanged.

In the third group, 7 patients received the highest dosage of 5 mgm./kgm. three times daily, 5 during 10 days and 2 for 8 and 9 days, respectively. Toxic reactions—fever and arthralgia—were observed in 5 ; 4 had headache, lumbago and swollen lymph nodes. Six had negative blood smears the day after treatment and these remained negative for 20–24 months. One patient who still presents microfilariae was treated for 8 days only.

In 3 patients simultaneous administration of pyribenzamine resulted in a decrease in the toxic reactions. *Philip Manson-Bahr*

MCGREGOR, I. A., HAWKING, F. & SMITH, D. A. **The Control of Filariasis with Hetrazan. A Field Trial in a Rural Village (Keneba) in the Gambia.** *Brit. Med. J.* 1952, Oct. 25, 908–11.

In collaboration with the Gambia Government Medical Department the Medical Research Council Human Nutrition Research Unit has been making detailed surveys in the village of Keneba in the West Kiang district of the Gambia Protectorate. An attempt was made to control filariasis by the use of hetrazan.

The treatment was directed primarily against microfilariae of *Wuchereria bancrofti*, but as double infections with microfilariae of *Dipetalonema perstans* are commonly encountered, information concerning the effect of the drug on this parasite also was obtained.

Blood approximately equal to 20 cmm. was taken by finger prick between the hours of 9 p.m. and midnight. Thick films were dehaemoglobinized, fixed in methyl alcohol and stained with haemalum.

The dose of hetrazan was 25 mgm. base per kgm. body weight in 5 equal daily doses—or 5 mgm. per kgm. daily for 5 days—and appeared to be the smallest dose likely to remove microfilariae permanently. Tablets of hetrazan citrate were used, each containing 250 mgm., equivalent to 125 mgm. of the base.

The total population of Keneba is 710. In February 1951 the night blood of 603 persons in the village was examined and it was found that 118 were infected with *W. bancrofti*, 101 were infected with *D. perstans* alone and 102 had microfilariae of both parasites. Sequelae were very uncommon and only 3 were found suffering from elephantiasis and an equal number had hydroceles—a total incidence of less than 1 per cent.

Altogether, 181 started the course and 171 completed it. In December 1951, 10 months after treatment, 569 people were examined : at this time 164 of the treated patients were available.

W. bancrofti

Of 154 infected persons who completed the prescribed course, 64 per cent. had blood free from microfilariae 10 months later. In the remaining 55 infection was still present, but the parasitaemia was substantially reduced. Thus before treatment the sum of microfilarial counts in the films of these 55 patients was 2,859 whereas 10 months later it was 305, a reduction of 89 per cent. The overall reduction of microfilariae in the 154 infected and treated persons was 94 per cent.

D. perstans

One hundred and forty persons with *D. perstans* in February were again examined in December. Of these, 69 had received treatment for associated *W. bancrofti* : the remaining 71 had been untreated. In the treated group 10 months after treatment there was a reduction of incidence of 72·5 per cent. Of the 19 treated patients remaining infected the level of microfilariaemia was reduced by 78 per cent. whereas in the untreated subjects who remained infected there was an 89 per cent. increase.

The first doses of hetrazan were accepted eagerly, but the incidence of disagreeable side-effects was very high so that enthusiasm rapidly diminished. Of 181 persons treated 25 per cent. complained of unpleasant effects attributed to the drug. *Headache* (17 per cent.) appeared to be general and persisted one or two days in most cases. *Anorexia* (10 per cent.) persisted throughout treatment in most cases. *Nausea* (8 per cent.) varied from one to five days. *Vomiting* (4·4 per cent.) was variable in onset, occurring after the first dose in some, in others after the fourth or fifth dose. *Abdominal pain* (4 per cent.) was stated to be severe and colicky in nature. *Diarrhoea* (2 per cent.) was mild and transient. *Dizziness* (1·7 per cent.) was not common. *Cough, pain in chest and pyrexia* (2·8 per cent.) appeared after the initial dose and were characterized by prostration and a temperature rising to 103°F. *Cutaneous eruption* was found in one patient (0·6 per cent.). *Localized painful swellings* (3 per cent.) occurring during the course of treatment may represent a change in tissue reaction at the site of an adult worm : 6 cases are described.

The permanent reduction of microfilariae to a low level might suffice to prevent the further spread of infection, but achievement of complete chemotherapeutic sterilization requires much higher doses of hetrazan and more prolonged treatment. It is agreed that since the effects of hetrazan on the microfilarial count persist for more than 10 months, it is probable that hetrazan in these doses produces a permanent effect upon the adult stages of *W. bancrofti*. In a few there were signs suggesting a cellular reaction around a dying worm.

The high incidence of ill-effects seriously jeopardized the success of the trial. It was with the utmost difficulty that this was completed. The cost of the drug is very great. Consequently attempts to use hetrazan for mass treatment in areas where the people are not concious of ill-effects from filariasis run a risk of costly failure. On the other hand the drug is very effective in diminishing the reservoir of microfilariae available for transmission.

[This report shows up clearly the difficulties encountered in conducting a hetrazan campaign even in a well-controlled African community, and the well-knit organization necessary to carry it through. A novel feature is the effect of hetrazan on *D. perstans*.] *Philip Manson-Bahr*

NETTEL F., R. Oncocercosis. Revisión del problema entomológico de la oncocercosis y plan para la erradicación de *Simulium ochraceum* Walker. III. [**Onchocerciasis. Review of its Entomology and Plan for Eradication of** *Simulium ochraceum*] *Medicina*. Mexico. 1952, Sept. 25, v. 32, No. 660, 438–41.

In this section of his work the author gives a list of all the Simuliidae known to exist in Mexico up to 1951. These are 60 in number, but it is not certain that these are all distinct, some may be species and genera already known under other names, in other words synonyms. In a table are given the names of 26 species met with in the State of Chiapas, 26 in Oaxaca and 36 in Vera Cruz. In Chiapas those attacking man are *S. ochraceum*, *S. metallicum*, *S. callidum*, *S. exiguum* and *S. haematopotum*. The first of these is the chief vector in Chiapas and Oaxaca where it is a real pest, but, though found in Vera Cruz, it is far less important there and its eradication in that State would not justify the time and expense necessary. At the same time, it may be that a plan to treat running water to deal with the eggs, larvae and pupae of one species might be equally effective against the others ; whether or not all species are equally susceptible to chemical or physical agents is at present unknown.

H. Harold Scott

NETTEL F., R. Oncocercosis. Revisión del problema entomológico de la oncocercosis y plan para la erradicación de *Simulium ochraceum* Walker. IV & V. [**Onchocerciasis. Review of its Entomology and Plan for Eradication of** *Simulium ochraceum*] *Medicina*. Mexico. 1952, Oct. 10, v. 32, No. 661, 449–65.

Following up the above communication the author next details almost year by year from 1904 to 1950 the measures which have been suggested and undertaken in different countries for eradication of Simuliidae at different stages of their development. [Numbers amounting to more than 100 are given in brackets after the names of authors and, presumably, they refer to a bibliography which may be appended later, if further instalments appear on this subject ; there is no list of references to the present paper.] There follows a description of the basin of the river Hinxtla in Chiapas, the volume and rate of flow of the main stream and of its tributaries and elaborate calculations of the approximate quantity of Gammexane, DDT or creolin needed to act as larvicides. Gammexane in strength below 5 mgm. per litre, or 5 parts per million, is inefficient, and 5 to 10 parts is better. Rough estimates are made of the amounts needed of the other larvicides and the paper ends with a short discussion of the probable costs of the project. *H. Harold Scott*

VARGAS, L. Algunos aspectos de la ecología de las larvas de simúlidos en relación con la transmisión de *Onchocerca volvulus* en Chiapas. [**Some Aspects of the Ecology of Simuliid Larvae in Relation to Transmission of** *Onchocerca volvulus* **in Chiapas**] *Medicina*. Mexico. 1952, Aug. 10, v. 32, No. 657, 353–61, 2 maps. [17 refs.] English summary.

GIBSON, C. L. & DALMAT, H. T. **Three New Potential Intermediate Hosts of Human Onchocerciasis in Guatemala.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 848–51.

Simulium veracruzarium, *S. exiguum* and *S. haematopotum* were found to be the dominant human biters in certain parts of Guatemala where onchocerciasis in man occurred. Laboratory-bred flies of these species refused to feed on infected patients ; but wild-caught flies from areas in which onchocerciasis was not endemic were used for experimental feeds on infected subjects. The infection rates in the laboratory series varied from 6·2 to 16·2 per cent. Dissections of wild-caught flies gave from nil to 2·6 per cent. (*S. exiguum*) infected with a filarial parasite. The infections in *S. exiguum* are thought to be of bovine origin. It is concluded that this evidence implicates these 3 species as possible vectors of human onchocerciasis, particularly where they replace, or occur as well as, *S. ochraceum*, *S. metallicum*, and *S. callidum*, the generally accepted vectors in South America. *D. S. Bertram*

ONABAMIRO, S. D. **The Geographical Distribution and Clinical Features of *Dracunculus medinensis* in South-West Nigeria.** *West African Med. J.* 1952, Oct.–Nov.–Dec., v. 1. (n.s.), No. 4, 159–65, 3 figs.

In south-west Nigeria dracontiasis is a common disease among the inhabitants of villages in low-lying areas where drinking water must be obtained from communal ponds during all or part of the year. On the other hand the disease is rare or non-existent among persons living in towns or villages situated near perennial streams or rivers. Among some 30 species of *Cyclops* investigated only 5, *Mesocyclops leuckarti*, *Mesocyclops leuckarti aequatorialis*, *Thermocyclops nigerianus*, *Thermocyclops inopinus*, and *Microcyclops varicans subaequalis*, were found capable of harbouring *D. medinensis* larvae for the 14 days necessary for their development to the infective stage. These 5 species are confined to habitats where the water is stagnant, with a *p*H between 6·0 and 6·8, and whereas they are absent from or very rare in flowing water they form the dominant cyclops population in village ponds. [See also this *Bulletin*, 1951, v. 48, 1032 ; 1953, v. 50, 54.] *R. M. Gordon*

SELKON, J. M. & LATHAM, W. J. **Calcified Guinea Worms in a South African Indian. Report of a Case.** *South African Med. J.* 1952, Nov. 15, v. 26, No. 46, 918–19, 3 figs.

THOMPSON, P. E. & REINERTSON, J. W. **Chemotherapeutic Studies of Natural Pinworm Infections in Mice.** *Exper. Parasit.* New York. 1952, Nov., v. 1, No. 4, 384–91. [13 refs.]

"Observations on the incidence and intensity of natural infections of *Syphacia obvelata* and of *Aspiculuris tetraptera* in a colony of white mice showed such infections provided convenient test material for chemotherapeutic studies. Eighteen compounds, including most of those variously recommended for the treatment of human oxyuriasis, were tested for information on the validity of mouse infections in screening for new agents. Drugs were administered in the diet or by oral intubation and the effects of therapy were measured by the complete eradication of pinworms in the cecum and large intestine.

"Gentian violet, phenothiazine, hexylresorcinol, tetrachlorethylene and carbon tetrachloride were effective against both species. The dose-response relationships of gentian violet were dissimilar for the two species. Thymol,

santonin, *p*-benzylphenylcarbamate and nine compounds not commonly considered as vermifuges failed to eradicate either species."

KOZAR, Z., WYSOCKA, Felicja & BŁAWAT, F. **Evaluation of Diagnostic Methods in Symptomatic and Latent Trichinosis in Human Beings on the Basis of 97 Observed Cases.** *Bull. State Inst. Marine & Trop. Med., Gdańsk, Poland.* 1952, v. 4, No. 3, 376–8. [Also fuller version in Polish 361–72 & in Russian 373–6.]

Of recent years, owing to better control of meat products, serious epidemics of trichinosis are rare : the disease tends to be uncharacteristic and even latent so that sporadic cases often cause difficulty in diagnosis.

The authors, in Poland, studied 97 cases which fell into 3 separate epidemiological groups : (*a*) mild epidemic, seen in out-patients and those in their homes often after examination of the whole family ; (*b*) serious family infection, caused by slaughter of meat on the family premises ; (*c*) sporadic serious cases seen in clinics, of which there were 5.

The authors divide the symptoms into typical and collateral. They regard the classical typical symptoms as being (1) ocular, especially palpebral oedema (2) headache (3) muscular pains (4) pyrexia (5) eosinophilia.

Diagnosis of the epidemic [group (*a*) above], which was of a new kind, proved difficult. Many patients did not seek medical advice or interrupt their work. The incubation period varied between " a dozen days or so to several score ".

The epidemic lasted for 3 weeks. In the 82 persons affected, the characteristic symptoms listed above occurred in 45. In 14, one of these symptoms was absent and this group was called " semi-symptomatic ". In 5 patients only one of the symptoms was present, constituting the " uncharacteristic " group and in 18 eosinophilia was the only classical feature (though specific serological tests were positive) ; this last was regarded as " latent infection ". Altogether, the five typical symptoms were found, respectively, in 60, 56, 53, 46 and 79 persons.

Additional symptoms encountered included general weakness (38), increased sweating (19), joint pains (21), hyperaesthesia (3), oedema other than ocular (19).

Eosinophilia varied between 10 and 30 per cent., but reached 54 per cent. in one case. It was maximal between the first and third week, or occasionally a week or two later. In 31 cases, it persisted into the fourth month. It was diagnostically very important and even at times decisive. The authors have reason to suspect trichinosis in all doubtful cases where eosinophilia is present. Even in mild cases, symptoms may persist for months, but in such mild cases alimentary manifestations are strikingly rare.

There were 10 persons in group (b), which exemplified the old type of epidemic which used to be met with particularly in Germany : 9 were typical. All 3 adults in the family died and the surviving children were seriously ill for several weeks. In addition to the usual symptoms, there were joint and gastro-intestinal symptoms in 4 patients. Eosinophilia was absent in only one case. Precipitation tests were done in 96 cases, with fairly good results, but the test did not tend to become positive until late in the disease. The microprecipitation test with living larvae was definite only in severe infections. Complement fixation was found to be very specific and sensitive. In 37 of 67 persons, the allergy reaction was positive when carried out in the fourth month. The authors recommend the use of several immunological tests. If two or three different tests are positive " the diagnosis is certain ". Serological tests and the allergy reaction should be used ; but while positive results may be decisive, negative results in the early stages do not exclude trichinosis.

H. J. O'D. Burke-Gaffney

Soo-Hoo, G. **Effect of an Arsenoso Compound on Experimental *Trichinella spiralis* in Mice.** *Exper. Parasit.* New York. 1952, Nov., v. 1, No. 4, 377–83. [10 refs.]

" (1) Evidence is submitted that a new arsenoso compound (*N*-(*p*-arsenoso benzyl)-glycine amide hydrochloride), if given once shortly after an oral inoculation of 2000 larvae of *T. spiralis* prevented fatal outcome in 64% of the animals over a 10 week's observation period.

" (2) The active dose (500 mg/kg *per os*) was identical with the maximal tolerated dose ; a smaller dose of 250 mg/kg caused only delay of death. Longer intervals between inoculation and treatment interfered similarly with the effectiveness of the drug.

" (3) The arsenoso compound exerted an effect on *Trichinella* larvae exposed to it *in vitro* for at least 6 to 24 hours."

DEFICIENCY DISEASES

Jones, E. B. **The Economic Aspects of African Malnutrition in Southern Rhodesia.** *South African Med. J.* 1952, Nov. 1, v. 26, No. 44, 878–81

In Africa to-day the people of the British Commonwealth find both their greatest moral problem and their most urgent technological task. Our relations with the African people will not become satisfactory, until we can help them to develop the resources of their own countries so to supply essential physiological needs. These problems cut across the artificial divisions of knowledge set up in our universities for the convenience of teachers. This short article attempts to set a perspective. The development of natural resources, malnutrition, the cost of sickness, agriculture, education and industry, the improvements of living standards, military and civil defence are each set out as things that cannot be discussed independently of each other. All these subjects are lightly but delicately handled. If the South African Medical Journal can continue to publish such informed and sympathetic articles, then the medical profession will be making a great contribution to Africa's future.

R. Passmore

de Wijn, J. F. **Errors in the Evaluation of the Nutritional Condition of Schoolchildren.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1952, Sept., v. 4, No. 3, 273–7, 2 graphs.

Growth curves of schoolchildren are frequently used as an assessment of the nutritional status of groups of children. To construct such curves accurate measurements of weight, height and age are needed. Unfortunately in parts of the Far East, it is difficult to get reliable figures for the age of children. Some observers have plotted body weight against height in an attempt to get over this difficulty. This procedure leads to serious error : for instance the height-group 120 to 130 cm. in Indonesia includes both under-nourished adolescents and well-fed children of a younger age-group. Graphs are given showing how this error may give rise to misleading conclusions in field work.

R. Passmore

Bergouniou, J. L. Malnutritions et sous-nutritions chez les jeunes enfants de la presqu'île du Cap-Vert. [**Malnutrition and Undernutrition in Young Children of the Cap-Vert Peninsular**] *Bull. Méd. de l'Afrique Occidentale Française.* 1952, v. 9, No. 1, 51–70.

In a clinical examination of 665 children under 7 years of age in 9 villages, the author found 14 with the complete clinical picture of kwashiorkor and 30 with some of the features of the disease. Thus 6·4 per cent. of all the children presented clinical evidence of undernutrition. Kwashiorkor was not found in villages where the people had milk cattle. It was, however, prevalent in two villages where the inhabitants ate fish regularly. The fish consumed were sardines, herrings and anchovies. In other villages where the chief catch consisted of Serranidae (bass or sea perch), kwashiorkor was not found and the suggestion is made that the quality of the fish consumed is important.

Malarial fever also appears to be an important factor in the appearance of signs of malnutrition. *R. Passmore*

Mukerji, S. K. **Infantile Cirrhosis of Liver.** *J. Indian Med. Ass.* 1952, Oct., v. 22, No. 1, 6–12, 3 figs. [27 refs.]

This paper contains a useful general review and an analysis of the records of 200 cases admitted to the Medical College Hospital at Indore from 1938 to 1949. The highest age incidence was in the second year, which included 96 cases. However, 40 patients were under one and the youngest only 2½ months of age. Only 8 were over 4 years. As the disease has an insidious onset and there is often a long interval between the first appearance of symptoms and seeking of medical advice, the pathological processes must often begin very early in life. There was a marked preponderance of boys and only 26 girls are in the series. In 52 cases a brother or sister was also affected. Almost all the patients were from lower middle class and middle class families. All the patients were receiving milk in some form and 35 were entirely breast fed at the time of admission.

It was not possible to follow up the effects of treatment. The majority gradually got worse and died. A few with undoubted cirrhosis have got better on following a simple dietary régime.

[This paper gives a general good account of the management of the disease and is recommended to any newcomer in India.] *R. Passmore*

Hueck, O. Beriberi in Tungkun, Südchina. [**Beriberi in Tungkun, South China**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Oct., v. 4, No. 1, 127–30.

Beriberi is not commonly seen in Tungkun, 70 cases only in 11 years, 1940–50 inclusive, compared with the large numbers reported in the not far distant Hong Kong and Canton. Beriberi is said to be the main cause of infant mortality in Hong Kong and 25 per cent. of the mothers showed symptoms of the disease. In the Military Hospital at Canton in 1937 there were 1,200 beriberi patients. Of the 70 in Tungkun in 11 years 51 were males, 19 were females ; 19 were in their third decade, 16 in the fourth. In two only of the 11 years did the total reach double figures, *viz.*, 16 in 1947 and 11 in 1948 but, strange as it may seem, these were not years in which there were food deficiencies ; these years were 1943 and 1944 in each of which there were only 4 cases. When the Chinese are not feeling very well they abjure fruit and vegetables and keep mainly to rice and some salt fish. The majority of cases of beriberi occur in the month of June when rice which has been kept for a long

time is used. In 23 of the patients helminthic infections were found, *Ascaris* (in 18) being the most common. Treatment on the usual lines is successful [but no explanation is offered to account for the rarity of cases in Tungkun compared with the large numbers in the nearby towns of Hong Kong and Canton.]

H. Harold Scott

See also p. 249, JELLIFFE, **Infective Gangrene of the Mouth (Cancrum Oris).**

VIJAYARAGHAVAN, P. K. & PATWARDHAN, V. N. **The Influence of Poor Rice Diet on Livers of Albino Rats.** *Indian J. Med. Sci.* 1952, Oct., v. 6, No. 10, 696–707, 3 figs. [38 refs.]

"Two groups of albino rats were maintained on two diets made up of natural food stuffs, *viz.*, poor rice diet and stock colony diet for a period of 23 months and the chemical and structural changes in the livers were observed at frequent intervals. The poor rice diet was found to be particularly deficient both in choline and methionine.

"Livers of animals receiving the poor rice diet had abnormally high amounts of fat as compared with those of rats on the stock diet. The higher fat content of livers in the poor rice group was attributed to the combined deficiencies of choline and methionine in the diet.

"Supplements of choline or methionine to the poor rice diet brought down the level of fat in the livers to values approximately the same as those of the stock group.

"Evidence of early degenerative changes was found in livers of eight rats fed on the poor rice diet for periods of 15 to 21 months. The changes, which are described in the text, were attributed to the deficiency of choline in the poor rice diet which imposed extra demands on dietary methionine for lipotropic activity thus making the amino acid unavailable in sufficient amounts to meet other demands."

SPRUE

DIÉZ RIVAS, F., HERNÁNDEZ MORALES, F. & KOPPISCH, E. **The Adrenal Gland in Tropical Sprue.** *J. Amer. Med. Ass.* 1952, Oct. 18, v. 150, No. 7, 647–50, 1 fig.

It has often been suggested that a number of sprue symptoms and signs may be due to impaired suprarenal function. Folic acid, vitamin B_{12} and liver extract all improve many cases of sprue, but they often do not affect the "flat" oral glucose tolerance curve. The authors examined the suprarenals of 13 sprue patients who had come to autopsy, none was without profound pathological changes. The periadrenal fat was atrophic, and there was replacement of cortex cells by loose and oedematous areolar tissue. There was invasion of cortex and medulla by small groups of cells, resembling lymphocytes.

Suprarenal cortex function tests were performed on 18 sprue patients. All were well nourished and considered to be in a state of remission. They had recently been treated or were still receiving treatment with folic acid, liver extract or vitamin B_{12}. Kidney and liver function tests gave normal values in all 18. Fourteen patients had definite hypotension, though none was dehydrated or suffered from excessive diarrhoea ; 4 were anaemic, and increased pigmentation of the skin could be detected in 9.

(1) The Kepler water test (usually called the Robinson-Power-Kepler test) is based on the fact that in patients who have Addison's disease, on taking a large quantity of water, diuresis is greatly delayed ; they also retain urea and excrete excess chloride. Abnormal results have also been reported in chronic nervous exhaustion, cachexia, hyperthyroidism, pituitary insufficiency, congestive heart failure and diseases of the liver and the kidney ; such conditions were not found in the 18 subjects. Delayed water excretion was seen in 17 patients, and 11 had a plasma chloride level below normal [not above as the text states mistakenly] ; urinary urea concentration was low in 17 patients. " Factor A ", which is calculated from the concentrations of urea and chloride in urine and plasma and the volumes of day and night urine, was abnormal in 16.

(2) The Cutler-Wilder test involves restriction of Na intake and addition of K to the diet. In suprarenal insufficiency an undue amount of Na continues to be lost in the urine. Raised Na excretion was seen in 4 patients, borderline values were obtained in 3.

(3) The 24-hour excretion of urinary 17-ketosteroids was below normal in 6 of 10 men and one of 8 women.

(4) The Thorn test is based on the absence, in patients with suprarenal insufficiency, of the usual profound drop in the number of circulating eosinophiles after a single injection of 25 mgm. ACTH. Thirteen patients were thus tested and 6 gave abnormal results.

Of 18 patients one gave abnormal values in all 4 tests, 7 were abnormal in at least 3 tests. Thus nearly half of the 18 patients with tropical sprue in remission gave evidence of suprarenal insufficiency. *H. Lehmann*

HAEMATOLOGY

JELLIFFE, D. B. **Acquired Haemolytic Anaemia with Haemoglobinurea in an African Infant.** *J. Trop. Med. & Hyg.* 1951, Dec., v. 54, No. 12, 247–9, 1 fig.

A Yoruba infant 16 days old developed haemoglobinuria ; two days later he developed jaundice. There was no fever or vomiting. He had been born in hospital and discharged in good health 2 days before the haemoglobinuria developed. He was readmitted to hospital when 20 days old and found to have a large liver (2 cm. below the costal margin), a large spleen (2·5 cm. below the costal margin), a moderate degree of jaundice and marked anaemia, but a well-healed and clean umbilicus and a rectal temperature of only 99°F. There were no lesions suggestive of snake or spider bite (*Latrodectus*). The blood showed a hypochromic anaemia with 15 per cent. haemoglobin (Sahli) and 1·5 million red cells per cmm. The blood was Rh positive and there was no evidence of sickling. Malaria parasites were never found.

Mepacrine, vitamin K, injections of crude liver extract, and oral iron were given ; a blood transfusion was refused.

The haemoglobinuria continued for 3 days and the jaundice for 5 ; there was a low pyrexia for a week. The blood picture improved rapidly and the haemoglobin was 60 per cent. at the end of a month, and the liver and spleen were only just palpable. The infant was seen 3 months later when it appeared to be well.

The differential diagnosis is discussed ; Winckel's disease is suggested as a possible diagnosis or as an alternative some form of acquired haemolytic anaemia of the Lederer type. [Can blackwater fever be entirely excluded ?] *L. E. Napier*

Choremis, C., Zervos, N., Constantinides, B., Zannos, L. & Sklavounou, S. **Sickle Cell Anemia in Greece.** *Schweiz. med. Woch.* 1952, July 5, v. 82, No. 27, 709–12. [21 refs.]

Sickle-cell anaemia, which is a chronic hereditary haemolytic anaemia, was first studied in American Negroes, in about 8 per cent. of whom there is a tendency for the red blood cells to assume a sickle shape under conditions of anoxaemia (the sickle-cell trait). However, only about 1 in 40 showing this trait suffer from the disease. In African Negroes the percentage showing the trait varies over a wide range, 2 per cent. to 45 per cent. in different tribes.

Recently, the authors encountered 15 patients with sickle-cell anaemia, children from the town of Petromagula in Greece [this *Bulletin*, 1952, v. 49, 175]. The children showed special clinical features that were unlike those usually seen in this disease or in Cooley's anaemia : they " had a flat nose, only slightly prominent cheek bones, a wrinkled skin of the upper lip which uncovered very easily the gums of the upper jaw during smile and a certain degree of infantilism ".

Further investigation in this town revealed that 150 of 1,016 inhabitants showed sickling in wet preparations after 24 to 72 hours. The sickling trait was thus present in 15·64 per cent. of 1,016 persons and the sickle-cell disease in at least 15 of 6,000 inhabitants or in 0·25 per cent.

Anthropological studies do not throw any light on the problem of why such a high proportion of the white Greek population of this town should suffer from sickle-cell disease or the trait. The authors think it possible that an explanation can be found in the fact that the Greeks have been chronically ill-nourished since the Turkish occupation in 1453 A.D., and that there has been considerable intermarriage. To this has been added the effects of malaria. They also believe that Cooley's anaemia is dependent on the same factors, malnutrition, intermarriage and malaria, and have observed that patients with the latter disease usually come from malarious districts and are among the poor rural classes.

It is tempting to consider that the two diseases, sickle-cell anaemia and Cooley's anaemia, are identical, but the authors believe that they are rightly considered as distinct, though they consider that there is an epidemiological relation. *L. E. Napier*

Brain, P. **The Sickle Cell Trait. Its Clinical Significance.** *South African Med. J.* 1952, Nov. 22, v. 26, No. 47, 925–8. [22 refs.]

The facts of this investigation are that—as shown in East and West Africa before, so also among the workers in a Southern Rhodesian mining company—sickle-cell trait carriers were no more anaemic or spent more time in hospital than their fellows. The theoretical conclusion is that these sicklers were heterozygous for the gene. A letter to the *British Medical Journal*, 1952, v. ii, 880 by the author promised evidence suggesting that sicklers were in fact healthier than non-sicklers. The figures now published are as follows : an examination of hospital records showed that 50 sickle-cell trait carriers spent 1,482 out of 74,164 working days in hospital (2 per cent.), a control group of the same tribal composition was in hospital for 1,699 out of 70,822 days (2·4 per cent.). [It is only fair to state that the author himself points out that more material will be needed for a decision on this problem. While it is necessary for the abstracter to point out the weakness of some theoretical conclusions, it must also be stated that the paper contains most useful evidence regarding the sickle-cell trait in a part of Africa where as yet little is known.]

Of 923 fit men examined 34 (3·7 per cent.) were sicklers, of 464 hospital-admitted men 17 (3·7 per cent.) were carriers of the trait. The mean haemoglobin level in 30 non-sicklers was 109 per cent. (87–140), in 30 sicklers it was 109 per cent. (92–131) ; 100 per cent. haemoglobin was equal to 13·8 gm. per cent. All the men were " selected " for health as they had come from afar to work in the mine, but the author does not think that the trait incidence among them was lower than among those who stayed at home. He compared the trait incidence in Angoni and Chewa workers at the mine with that found by Beet in their Northern Rhodesian homes [this *Bulletin*, 1947, v. 44, 1091]. Beet found 33 of 359 Angoni to be sicklaemic (9·2 per cent.), the author discovered 7 among 108 (6·5 per cent.) ; the figures for the Chewa were 65 sicklaemics among 522 found by Beet (12·5 per cent.) and 10 sicklaemics among 111 seen by the author (9 per cent.). *H. Lehmann*

Edington, G. M. & Sarkies, J. W. R. **Two Cases of Sickle-Cell Anaemia associated with Retinal Microaneurysms.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Jan., v. 46, No. 1, 59–62.

While investigating sickle-cell anaemia in Accra, one of the writers had observed that a spontaneous history of generalized muscle pains and pains in the large joints suggesting rheumatism was usually an indication that the subject was suffering from sickle-cell anaemia. The two patients whose cases are reported here gave such a history though both attended with complaints about their eyes.

The first patient was an African of the Ga tribe, aged 16. One of his two sisters also suffered from periodic attacks of rheumatism. He complained of pain and redness of both eyes. His vision was 6/5 in each eye. He had punctuate corneal lesions in both eyes and in the left he had two small aneurysms towards the periphery with a small haemorrhage near one.

The blood showed a low count within the normal range, reticulocytes 6·1 per cent., poikilocytosis, anisocytosis, target cells, a few sickle-cells and nucleated red cells. Sickling occurred in 100 per cent. of erythrocytes " by the rapid method " (in 15 minutes after a bacterial culture has been added) [this *Bulletin*, 1946, v. 43, 243]. Serum bilirubin was 1·1 mgm. per cent. No malaria parasites were found. X-ray of the skull showed " changes associated with anaemia ". Ten weeks later the patient again appeared with fever and joint pains. There were no malaria parasites. The haemoglobin was slightly lower (13·3 gm. per cent.) and the reticulocyte and serum bilirubin slightly higher (10·1 per cent. and 1·2 mgm. per cent., respectively).

The second case was that of a male of 22 of the same tribe. He complained of gradual loss of vision in the left eye. He had a similar history of periodic attacks of pain in the back and large joints, continuing with decreasing frequency since childhood.

In his left eye he had a dense vitreous haemorrhage with perception of light only. In the right eye there was a small morular aneurysm of the inferior temporal vein and a smaller one of the superior.

His blood showed a slight hypochromic anaemia and 100 per cent. sickling " by the rapid method ". The bilirubin was 1·3 mgm. per cent. The X-ray report was as follows : " The lateral radiographs of the skull showed changes of Cooley's erythroblastic or sickle-cell anaemia from the region of the coronal suture for about 2½ inches backwards along the vault of the parietal bones ".

One of 6 siblings was examined. She gave no history of joint pains but her blood showed the sickling trait.

The authors consider that blocking of blood vessels by sickle cells, stasis and subsequent thrombosis might be the cause of the micro-aneurysms that occurred in these two cases. *L. E. Napier*

CHANDLER, B. F. & KEHOE, E. L. **Priapism in Sickle Cell Anemia.** *U.S. Armed Forces Med. J.* 1952, Nov., v. 3, No. 11, 1699–701.

VENOMS AND ANTIVENENES

BOQUET, P., BUSSARD, A. & IZARD, Y., with the technical collaboration of D. LESIMPLE. Influence de l'hyaluronidase sur les propriétés thérapeutiques du sérum antivenimeux. [**Influence of Hyaluronidase on the Therapeutic Properties of Anti-Venin Serum**] *Ann. Inst. Pasteur.* 1952, Nov., v. 83, No. 5, 640–52. [26 refs.]

The following is a translation of the authors' summary :

1. Hyaluronidase favours the diffusion of anti-venin serum (anti-*Naja tripudians*) under the skin of guineapigs and increases the speed of its passage in the blood.

2. When the serum is given to guineapigs 30 to 45 minutes after the injection of a dose of cobra venom, lethal in a few hours, the protection of the surviving animals is higher among those treated with a mixture of serum and hyaluronidase than among those having serum alone.

3. Three hours after subcutaneous injections of anti-venin serum, the blood of the test animals contains less than 1 per cent. of the total quantity of the anti-venin injected. During the same period, the blood of animals treated with a mixture of this serum and hyaluronidase contains two or four times as much.

4. In the conditions of these experiments, anaphylactic accidents are not so frequent among the guineapigs treated with a subcutaneous injection of a mixture of anti-venin serum and hyaluronidase as among those treated with serum alone, when these rodents have been sensitized by an injection of horse serum. *H. J. O'D. Burke-Gaffney*

VACHON, M. Études sur les scorpions. [**Studies on Scorpions**] Préface de Louis FAGE. 482 pp., 697 figs. 1952. Algiers : Institut Pasteur d'Algérie. [63*s.*]

DERMATOLOGY AND FUNGUS DISEASES

MEDINA, R., CONVIT, J. & CONTRERAS, R. Formas recientes del carate. Observaciones clínicas e histopatológicas. [**Early Forms of Pinta. Clinical and Histological Observations**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1950, Jan., v. 2, No. 1, 235–47, 9 figs. [10 refs.] English summary (9 lines).

This is a study of 7 cases of mal del pinto at an early stage. Usually the course of lesions regarded as typical is an initial erythemo-squamous papule, growing slowly, becoming dyschromic, later generalized (secondary period) with multiple maculae (the pintids of León Blanco), all erythematous but some partly squamous, some pigmented and some hypochromic ; lastly, after months

or even years, there are pigmented blotches, dark brown, slate- or lead-coloured, or even red. Very slowly the pigment is lost and leucodermic areas, usually fairly defined, are left. Those studying the disease in Mexico and Cuba record finding treponemata in abundance in these cutaneous lesions and plantar hyperkeratosis frequently. The authors state that in Venezuela the loss of pigment often occurs early, treponemata are few and found, it may be, only after half an hour's search ; also they have never met with plantar hyperkeratosis in " pure pinta ", but only in those with a history of previous yaws. The authors give brief details of 7 patients illustrating these points, together with photographs of the lesions and photomicrographs of the histological changes in the skin, and they plead for a more detailed study of the disease, both epidemiological and clinical, as it occurs in Venezuela. *H. Harold Scott*

TARBET, J. E., WRIGHT, E. T. & NEWCOMER, V. D. **Experimental Coccidioidal Granuloma. Developmental Stages of Sporangia in Mice.** *Amer. J. Path.* 1952, Sept.–Oct., v. 28, No. 5, 901–17, 18 figs. on 4 pls. [21 refs.]

The objects of the present work were to determine the fate of non-sporing mycelium of *Coccidioides immitis* after injection into mice, to study the stages of development of the fungal parasite in its host and to observe the reactions of the host's tissues to the infection.

C. immitis was grown in mycophil broth covered with a layer of mineral oil, and the small, non-sporing colonies of undifferentiated mycelium which developed in 4 to 5 days at room temperature were collected and " homogenized " in a Ten Broeck tissue grinder. From this material a thick suspension was prepared and injected intraperitoneally, in 0·5 ml. doses, into 50 male mice (ABC strain). The animals were killed in groups of 4 at intervals of 4, 6, 20, 24, 30 and 48 hours and then 2 daily until the 14th day.

Smears and tissue sections were prepared and stained by haematoxylin and eosin, Giemsa's method and the periodic acid-Schiff technique and examined microscopically. These examinations showed that soon after injection the fungal fragments were dispersed throughout the peritoneal cavity so that, despite their number, they were very difficult to find. Shortly afterwards, however, they were agglutinated, non-specifically, and the resulting aggregates, lightly adherent to the peritoneal surface, became surrounded by a dense mass of polymorphonuclear cells, so that by the 2nd day after inoculation these little masses were visible to the naked eye as minute yellowish-white spots on the peritoneal surface. Some segments in the fungal fragments became swollen and rounded, forming primitive " spherules " and the remainder of the fungal material underwent degeneration and disintegration. These early spherules were found chiefly in the peripheral part of the leucocytic mass as the central part already showed early signs of degeneration. At this stage a layer of mucoid material having an alveolar structure formed on the surface of the mass and spread on to the surrounding peritoneal surface. This material was soon infiltrated by mononuclear cells which multiplied in response to the development of the spherules. By the 4th day the cellular masses had become firmly embedded in the underlying tissue and the infiltrating monocytes were surrounding some of the larger spherules. By the 5th, 6th, or 7th day many spherules, ranging from 15 to 65 μ in diameter, showed cleavage of the protoplasm surrounding the central vacuole ; the beginning of endospore formation. On the 6th and 7th days, mature sporangia were seen, some measuring up to 93 μ in diameter and filled with endospores. A few sporangia had ruptured and discharged their spores, which repeated the developmental cycle of the parasite and multiplied the lesions. The discharge of the endospores provoked

an immediate infiltration by polymorphonuclear cells, but the developing spherules stimulated activity of the monocyte elements. As the infection progressed, spherules or sporangia were present in all stages of development and the cytological reaction was of mixed monocyte and polymorphonuclear cell type.

The results of these experiments confirm the view expressed by CHOPE, nearly half-a-century earlier, that the parasitic sporangium could develop from an inoculum of non-sporing mycelium as well as from the chlamydospores.

J. T. Duncan

BENAÍM PINTO, H. Contribución al estudio de la paracoccidioidosis brasiliensis en Venezuela. Notas clínicas y terapéuticas, con presentación de 7 casos. [**Contribution to the Study of** *Paracoccidioidosis brasiliensis* **in Venezuela. Clinical and Therapeutic Notes with Presentation of Seven Cases**] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1950, Jan., v. 2, No. 1, 183–222, 30 figs. English summary.

The earliest report of South American blastomycosis (*Paracoccidioides brasiliensis*) in Venezuela was made in 1937, when a description was published of 3 cases identified at autopsy. Since then reports of 18 others have appeared, most of which were diagnosed during life. The principal clinical features of these 21 patients, with the basis of diagnosis, have been summarized in tabular form in the present paper, and more detailed descriptions are given of 7 additional cases observed by the author at Vargas Hospital, Caracas, over a period of 3 years.

The ages of 27 patients, from both groups, ranged from 22 to 80 years (average 46). Of 23 patients whose sex was stated, 20 were males and 3 females, and a possible occupational factor is indicated by the fact that 12 out of 16 (75 per cent.) were agriculturists, although the possible epidemiological significance of this observation is not discussed.

Among the 7 cases specially described, mucosal lesions were present in all, and these affected chiefly the inner aspect of the lips, the gums, buccal mucosa, tongue, soft palate and tonsils, and, in one patient, also the pharynx, larynx and nares. Ulceration of the small and large intestines was not uncommon and in one case the ano-rectal mucosa was involved, with extension on to the perineal skin. In 3 other patients the skin of the face was involved by extension of disease from the mouth. The resulting lesions were shallow, almost painless ulcerations on a granulomatous infiltration of the skin. Lesions of this kind, healing by scar-formation, may cause marked deformity of the mouth and difficulty in feeding.

Pulmonary lesions, shown by radiography, were present in all cases and ranged from extensive bilateral infiltrations to isolated small nodules; they were situated principally in the lower lung fields. Dyspnoea and cough, sometimes with blood-streaked sputum, were not infrequent but *P. brasiliensis* was only occasionally found in the sputum. At a more advanced stage, local fibrosis, calcification and emphysema were observed.

Lymphadenopathy, regional or general, affecting chiefly the submaxillary and cervical groups, was not uncommon, and in one case there was massive involvement of the mesenteric nodes with predominantly abdominal symptoms.

In the series of 7 cases, the mycological diagnosis was based most frequently on the identification, by microscopy, of *P. brasiliensis* in smears or sections from biopsy specimens, or in pus, but only once in sputum and never in bone marrow. The fungus was isolated in culture from one patient.

In treatment, marked clinical improvement, in one instance amounting to apparent cure, resulted from administration of sulphathiazole, sulphadiazine

or both, in doses of 3 to 6 gm. daily over long periods. Antibiotics had no observed therapeutic effect. *J. T. Duncan*

TROPICAL OPHTHALMOLOGY

DELANOE, E. Historique de la lutte antitrachomateuse au Maroc de 1913 à nos jours. [**History of the Campaign against Trachoma in Morocco from 1913 to the Present Day**] *Maroc Méd.* 1952, Oct., v. 31, No. 329, 812–17. [33 refs.]

STERGAR, S. Trahom v Sto. Kritična presoja trahomskih epidemij in pregled dela v coni B. [**A Critical Review of the Trachoma Epidemic and an Account of the Campaign in Zone B**] *Zdravstveni Vestnik.* Ljubljana. 1952, v. 21, Nos. 5/6, 85–7, 1 map. English summary.

Isolated cases of trachoma have long been observed in Trieste and Istria, and have possibly originated from Southern Italy, where the disease is endemic. An outbreak occurred in schoolchildren in Kopar [south of Trieste] in 1950, and as a result an examination of all children of school age in zone B was carried out. The localities covered by the investigation are shown in a map. In all, 39 cases of trachoma and 52 suspected cases were discovered and treated ; the disease had almost been eliminated when a similar investigation was carried out one year later. Contact cases were seldom found in the families of the affected children. Communities in Istria are scattered, and apart from contact in schools, conditions are not favourable for the spread of the disease. Treatment of trachoma in zone B is compulsory and is carried out free of charge.

D. J. Bauer

NGUYEN DINH CAT. **Comments on the Treatment of Trachoma with Aureomycin.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 796–8.

The author used aureomycin ointment in the treatment of 22 cases of trachoma. Most of the cases were in the stage when granulations became apparent. He formed the conclusion that the application of aureomycin to trachomatous lesions after curettage of granulations seemed to be a method of treatment of trachoma, in the initial and evolutive stages only, which might well be recommended in preference to other techniques.

Aureomycin is well tolerated and accelerates cicatrization of trachomatous lesions. *E. W. O'G. Kirwan*

NGUYEN DINH CAT. **Terramycin in the Treatment of Trachoma.** *Amer. J. Trop. Med. & Hyg.* 1952, Sept., v. 1, No. 5, 799–807, 6 figs. on 2 pls.

The author has used terramycin locally on 14 patients from 8 to 25 years of age. Of these 7 had florid and luxuriant granulations ; 2 were cases of sclerocicatricial trachoma without corneal complications ; there were 3 with pannus and 2 with intensive secondary infections. The results indicated that terramycin used locally, after curettage of the lesions, gave encouraging results comparable with those obtained with aureomycin. Against secondary infections it had a rapid and dramatic action (3 to 5 days). In evolutive trachoma, and especially in florid forms, it was useful but its action was slow (6 to 8 weeks). Against minor complications of trachoma such as blepharitis and pannus tenuis, it exerted a favourable action. It improved the subjective symptoms by reducing secretory manifestations, but did not cause reabsorption of sclerous lesions.

It was used in the form of drops of ointment in a strength of 0·1 per cent. 4 times a day and was very well tolerated by the patients.

Allergic reactions were not observed.

The author is of the opinion that terramycin cannot be regarded as a specific drug for trachoma, but is a valuable contribution in trachoma treatment.

E. W. O'G. Kirwan

MITSUI, Y. **Clinical Use of Terramycin in Ophthalmology.** *J. Faculty of Med., Baghdad, Iraq.* 1952, v. 16, No. 1, 25–31.

The author, writing from Japan, discusses the use of terramycin, and in his opinion it is revolutionizing the therapy of ocular infections. His experience is based on 2,000 patients and there seems to be no contraindication to its use.

Angular conjunctivitis caused by the Morax-Axenfeld diplobacillus is cured within a few days. A single application is often adequate to cure conjunctivitis caused by the pneumococcus and *Neisseria catarrhalis*. In hypopyon keratitis clinical cure results approximately after one week. In acute trachoma proper the author claims that treatment with terramycin brings about a radical cure, and that in chronic trachoma an eradication of the causative agent results.

Mass treatment in schoolchildren in the early stages of the disease is carried out by use of 0·5 to 1·0 per cent. ointment of terramycin three times daily for 4 weeks. This should produce cures in about 80 per cent. of cases.

In chronic trachoma 0·5 per cent. ointment is used three times daily for about one month. This produces an essential cure in about 80 per cent. of cases. A clinical cure is reached usually within 2–3 months but in the late chronic stages a longer period of time is required. If terramycin is used in combination with surgery, the time required to produce a clinical cure can be reduced considerably. Expression of the follicles at the time of institution of chemotherapy is best.

More recently the author has used a combination of terramycin and hyaluronidase in the form of an ointment. Hyaluronidase aids the penetration of the antibiotic into the conjunctiva. A preliminary study has revealed that more than 90 per cent. are cured.

[See NGUYEN DINH CAT, above, 1953, p. 246.] *E. W. O'G. Kirwan*

JOPLING, W. H. & KIRWAN, E. W. O'G. **Toxic Amblyopia caused by TB3: a Case Record.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Nov., v. 46, No. 6, 656–7. [11 refs.]

The authors refer to the literature concerning the use of thiosemicarbazone compounds in the treatment of tuberculosis and leprosy. Few toxic effects have been recorded in the treatment of leprosy with TB1, except in the case reported by LOWE [this *Bulletin*, 1952, v. 49, 632] in which non-fatal agranulocytosis occurred.

A compound more recently used is TB3, marketed under the name of "Ethizone"; the authors used it in the treatment of leprosy in a patient who had already shown steady improvement on TB1: reports on the superiority of TB3 in experimental tuberculosis suggested this change.

The patient received 200 mgm. of Ethizone daily in divided doses. After 19 days of this treatment, blurring of vision appeared and progressed steadily: it was not reported by the patient for 10 days, when examination proved that his vision in each eye was 6/24 and there was a burning sensation in the eyelids. No other ophthalmological changes were noted. Toxic amblyopia

of the ganglion cells of the retina was diagnosed and the new drug was stopped. Weekly examination indicated a steady improvement in vision. Twenty-one days after the drug was stopped, vision had improved to 6/12, and a week later the original compound, TB1, was given in small initial doses (25 mgm.) every other day, and increased gradually until two months later he was receiving the maximum dose of 150 mgm. daily. By this time, vision was 6/9 and a few weeks later it was 6/6 in the right eye : similar improvement to 6/6 in the left eye occurred 2 months later.

The authors recommend that when TB3 is given, complete ophthalmological examination should be made before treatment begins and that during treatment weekly tests for disturbances in vision should be made. Early signs of toxicity may thus be detected and immediate withdrawal of the drug made so that serious damage to the retina and visual pathway may be avoided.

H. J. O'D. Burke-Gaffney

See also p. 185, FALCONE, Complicazioni oculari nella malaria. [**Eye Complications of Malaria**]

TROPICAL ULCER

AMPOFO, O. & FINDLAY, G. M. **Treatment of Tropical Ulcer with Terramycin Ointment.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Nov., v. 46, No. 6, 650–52. [10 refs.]

The authors refer to previous records of the use of antibiotics in the treatment of tropical ulcer [this *Bulletin*, 1952, v. 49, 82, 550, 647, 648]. They then describe the treatment with 3 per cent. terramycin ointment of ulcers in 6 African children in the Gold Coast. The ulcers were on the lower part of the leg or foot and less than 4 weeks in duration. The terramycin ointment was applied night and morning for a week, and then replaced by a dry dressing until healing was complete.

The results are shown in a table : spirochaetes disappeared in 1–5 days and fusiforms in 3–5 days. In four cases, however, fungi morphologically resembling *Candida albicans* appeared after 3 to 6 days. It is believed that their presence accounted for the fact that the average time for complete healing was just over 4 weeks.

It is noteworthy that fungal infection should have occurred away from the alimentary tract in association with terramycin therapy, though such infection around the anus and genitals is well recognized in this connexion. There were no other toxic reactions and no relapses after 3–4 months.

H. J. O'D. Burke-Gaffney

ROTHE, H. Die Anwendung von Supronal als Grundlage einer erfolgreichen Behandlung des Ulcus tropicum. [**Use of Supronal as a Basis for Effective Treatment of Tropical Ulcer**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Oct., v. 4, No. 1, 37–40, 2 figs.

The English summary appended to the paper is as follows :—

" Supronal proved highly effective in grave cases of tropical ulcer defying regular treatment. Given orally (40 grams within 6 days), supronal acts as a bacteriostatic, suppresses bacterial superinfection, and prepares the ulcerated area for appropriate surgical measures. One illustrated case report is given."

MISCELLANEOUS DISEASES

JELLIFFE, D. B. **Infective Gangrene of the Mouth (Cancrum Oris).** Reprinted from *Pediatrics*. Springfield, Ill. 1952, May, v. 9, No. 5, 544–50, 2 figs. & 1 chart. [15 refs.]

Although cancrum oris is now a rarity in temperate countries, the condition is still widespread in the tropics. In recent years reports have come from 10 countries and this paper adds an account of 53 cases in Nigerian children. A prolonged period on an unsatisfactory diet and in particular protein and vitamin B privation are important adjuvant causes. Most of the patients also suffered from malaria (*P. falciparum*) and a variety of intestinal parasites. One-third of these patients died, but some made excellent recoveries on a high protein diet and intramuscular procaine penicillin (150,000 units) daily. Photographs are given of two such children before and after treatment and illustrate clearly the improvement obtained. *R. Passmore*

SCHULERT, A. R. & LEWIS, H. B. **Experimental Lathyrism.** *Proc. Soc. Exper. Biol. & Med.* 1952, Oct., v. 81, No. 1, 86–9, 1 fig.

"A comparison of the toxicity of the seed of 5 species of *Lathyrus* for the rat has been made. Intoxication with *L. sylvestris Wagneri* has also been studied in the white mouse, rabbit, and guinea pig. A partial purification of the toxic principle of *L. sylvestris Wagneri* which has concentrated the factor about 40 times is described."

MAUZÉ, J. *Larva migrans* en Guadeloupe. [**Larva Migrans in Guadeloupe**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 5, 612–14, 2 figs. on 2 pls.

PROTOZOOLOGY : GENERAL

STEEN, E. & KÅSS, E. **A New Toxoplasma Antigen for Complement Fixation Test.** Reprinted from *Acta Path. et Microb. Scandinavica.* 1951, v. 28, No. 1, 36–9.

The authors describe a new and improved method of preparation of antigen for complement fixation in toxoplasmosis. Mice infected with *Toxoplasma* by the intraperitoneal route are killed on the 4th day, their peritoneal exudates are pooled, centrifuged for 30 minutes at 3,000 rpm, and the supernatant fluid, containing soluble proteins, is discarded. The sediment, containing the parasites, is suspended in enough saline to bring the volume up to that of the original exudate. The suspension is then frozen in a mixture of CO_2 and alcohol and thawed in tap water, the process being repeated 5 or 10 times, after which the suspension is centrifuged for 10 minutes at 2,000 rpm. The supernatant fluid, which is water-soluble and without anticomplementary effects, represents the antigen.

In a titration experiment the antigens were used undiluted or in dilutions of 1 : 2, 1 : 4, 1 : 8, etc., in 0·2 ml. volumes. To each tube were added 0·2 ml. of immune human serum diluted to 1 : 8, and 0·2 ml. fresh guineapig serum diluted in saline, providing 2 units of complement. After the antigens and antibodies had been allowed to combine for 60 minutes at 37°C., 0·2 ml. haemolysin (4 units) and 0·2 ml. of saline suspension of 3 per cent. washed sheep red cells were added, and the tubes were incubated in a water bath at 37°C. for 10 minutes, after which the reactions were read.

Complement fixation took place in dilutions of 1 : 8 or 1 : 16, whereas with control sera or with negative control antigens there was no reaction.

C. A. Hoare

VANĚK, J. Parasitární pneumonie z infekce *Pneumocystis carinii* u 60leté ženy. [**Parasitic Pneumonia from** *Pneumocystis carinii* **in a Woman of 60**] *Časopis Lékařů Českých.* Prague. 1952, Oct. 31, v. 91, No. 44, 1260–62, 5 figs.

The English summary appended to the paper is as follows :—

"In a 60-year-old woman, who died from abdominal form of Hodgkin's disease, both the lungs showed multiple subpleural cicatrices at post mortem. The changes in the lungs were caused by a parasite Pneumocystis carinii and, moreover, the inclusions of the cytomegalic virus were found.

"This is the first case of parasitic pneumonia due to Pneumocystis carinii and the third one of cytomegalic virus infection of the lungs, in an adult person.

"A contemporary infection by *Pneumocystis carinii* and cytomegalic virus was observed by the author in two of 16 cases of parasitic pneumonia of infancy."

[See also this *Bulletin*, 1952, v. 49, 908.]

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

BUXTON, J. A. & BRELAND, O. P. **Some Species of Mosquitoes reared from Dry Materials.** *Mosquito News.* 1952, Sept., v. 12, No. 3, 209–14. [14 refs.]

It is well known that the eggs of some species of mosquitoes can survive drying for long periods. Consequently, it should be possible to rear larvae from dry soil samples, collected in suitable habitats and placed in water in the laboratory. In the present study, 195 such samples were dealt with, of which 58 yielded mosquito larvae. The samples were placed in pans with strained pond or river water, and covered to prevent contamination by female mosquitoes. The larvae and adult mosquitoes which were reared in this way were found to include 19 species positively identified and 3 tentatively identified, in 5 genera, namely *Aëdes*, *Psorophora*, *Culex*, *Culiseta*, and *Anopheles*. The authors do not regard this as a practicable method of collecting mosquitoes, since less than one-third of the samples yielded larvae, and in many cases only a few specimens were obtained. Some observations were also made upon the laboratory behaviour of *Aëdes sollicitans* reared from dry material, and upon the ability of egg rafts of *Culiseta inornata* to withstand drying and freezing. It is not known in what stage the few specimens of *Culex*, *Culiseta*, and *Anopheles* which were obtained, survived the dry period, but it is thought to be the egg stage.

A. J. P. Goodchild

NASIR-UD-DIN, M. **Mosquitoes Breeding in Tree-Holes and Bamboo Stumps in Dacca (East Pakistan).** *Pakistan J. of Health.* 1952, July, v. 2, No. 2, 110–12, 1 graph.

Collections of water samples were made weekly from March 1949 to April 1950 from a treehole (*Samania* sp.) and from bamboo stumps.

From 30 samples of water from the tree hole 7,139 mosquitoes were reared. The only anopheline obtained was a single *Anopheles vagus*, but there were 15 species of culicines of which three made up 96 per cent. of the total, namely, *Culex brevipalpis*, *Aëdes albopictus* and *Aëdes annandalei*.

From 19 samples from the bamboo stumps, 1,477 mosquitoes were obtained. Again there was one anopheline only, *Anopheles hyrcanus nigerrimus*, but 13 species of culicines emerged of which 2 made up 85 per cent., *Aëdes albopictus* and *Armigeres obturbans*.

Aëdes aegypti was reared from both sources but only in small numbers. The numerical distribution of the different species is given and the numbers bred from the tree-hole each month are shown on a graph. *H. S. Leeson*

BLAKESLEE, T. E. **Chloride Ion Tolerance of Four Mosquitoes of Okinawa.** *Mosquito News.* 1952, Sept., v. 12, No. 3, 191–4.

The chloride ion tolerance of larvae of *Anopheles hyrcanus sinensis*, *Culex tritaeniorhynchus*, *C. quinquefasciatus* [*fatigans*], and *C. bitaeniorhynchus* was studied, in the hope that they might be controlled in fire barrels by the use of sea water. The problem was approached from two angles, on the one hand by sampling large numbers of breeding places and analysing the water for chloride content, and on the other hand, by laboratory observation of the larval mortality in various concentrations of sodium chloride solution. It was found that larvae of *C. tritaeniorhynchus* occurred regularly in water containing chloride up to the equivalent of 40 per cent. sea water, *A. hyrcanus sinensis* in up to 6 per cent. sea water and occasionally up to 33 per cent., while *C. fatigans* and *C. bitaeniorhynchus* were only found in up to 4 per cent. sea water. The tolerance of larvae to sodium chloride solutions was in the same order. Adult emergence of *C. tritaeniorhynchus* took place from solutions up to 1·25 per cent. sodium chloride, but with the other species this did not occur from solutions stronger than 0·50 per cent. Owing to the dilution due to heavy rainfall, it was not thought advisable to rely on sea water to inhibit breeding of *C. tritaeniorhynchus* or *A. hyrcanus sinensis*, although it might prevent breeding of the other two species for long periods. *A. J. P. Goodchild*

HUSBANDS, R. C. **Some Techniques used in the Study of *Aedes* Eggs in Irrigated Pastures in California.** *Mosquito News.* 1952, Sept., v. 12, No. 3, 145–50, 3 figs.

Three improvements in technique are described and illustrated in this paper. The collection of eggs of *Aëdes nigromaculis* and *Aëdes dorsalis* from soil is done by a tank-type vacuum cleaner mounted on a jeep. This removes a sample of soil without damaging or disturbing root growth. There is about one pint of soil in one square foot and this is then dried and screened. The eggs of these mosquitoes will pass a 60 mesh but are retained by an 80 mesh screen.

In examination, a rotary microscope stage is used to which a thin layer of soil is mechanically applied and moved into view in a continuous stream.

For recovery of newly laid eggs, it was found that caged females will deposit their eggs on moist white sand. The laying medium can be placed in a flotation separator which moves with a motion similar to that used in panning for gold. Eggs quickly come to the surface and accurate counts can be made. *H. S. Leeson*

VARGAS, L. Lista de sinonimos de los *Aedes* americanos (Diptera. Culicidae). [**List of Synonyms of American** *Aëdes*] Reprinted from *Rev. Soc. Mexicana de Hist. Nat.* 1949, Dec., v. 10, Nos. 1/4, 219–24. English summary (3 lines).

VARGAS, L. Nota sobre *Aëdes*. Revision de algunos *Ochlerotatus* americanos. *Kummyia* n. subgen. (Diptera Culicidae). [**Note on** *Aëdes*. **Review of American** *Ochlerotatus*] Reprinted from *Rev. Soc. Mexicana de Hist. Nat.* 1950, Dec., v. 11, Nos. 1/4, 149–59, 3 figs. English summary.

VARGAS, L. & DOWNS, W. G. Tres especies nuevas de *Aëdes* (Diptera, Culicidae). [**Three New Species of** *Aëdes*] Reprinted from *Rev. Soc. Mexicana de Hist. Nat.* 1950, Dec., v. 11, Nos. 1/4, 161–72, 22 figs. on 5 pls.

The English summary appended to the paper is as follows :—

" The authors describe the larvae, pupae and adults, including male genitalia, of *Aedes* (*Ochlerotatus*) *shannoni* n. sp., *Aedes* (*Gualteria*) *ramirezi* n. sp. and *Aedes* (*Gualteria*) *kompi* n. sp. All of the above material was collected in the State of Morelos, Mexico, in a neotropical region close to the neartic (montane) zone.

" With the above described species, the Mexican species of *Aedes* (*Ochlerotatus*) now number 24 and of *Aedes* (*Gualteria*) 7."

PROVOST, M. W. **The Dispersal of** *Aedes taeniorhynchus*. **1. Preliminary Studies.** *Mosquito News*. 1952, Sept., v. 12, No. 3, 174–90, 4 figs. [10 refs.]

The salt-marsh mosquitoes, *Aëdes taeniorhynchus* and *Aëdes sollicitans* are very serious pests in Florida : indeed in 1951 the State spent about a million and a half dollars on attempting to control them. The author wishes to increase our knowledge of the biology of the adult mosquito and has carried out studies, planned not only to give information about the range of flight but of the more abstruse problems of the mechanics and cause of such flights.

Work has been carried out on the coast of south-western Florida where there are bays running far into the land with numerous islands in them, the shores being swampy and full of mangroves. In this area, as we suppose, there are immense numbers of resting eggs of the mosquitoes which are ready to hatch when flooded. In the course of the summer and autumn of 1951 the author observed 6 immense emergences, 3 of which were due to high tides and 3 to flooding of the swamps in the middle of the islands by very heavy rain.

The author's method was to collect large numbers of larvae and put them in one spot in tanks containing an appropriate quantity of the radio-active isotope of phosphorus. Approximately 3 million large larvae were exposed at, or about, the same time. About 1 million adult mosquitoes of both sexes were released from the tanks, the great majority of them on one evening in the month of August.

Samples of mosquitoes were recaptured by a large number of New Jersey light traps. Other devices were also in use.

The great majority of the recoveries were from the light traps, from 33 of which during a period of 39 days nearly 6 million female mosquitoes of this species were recovered, an average of just under 5,000 females per trap per night. Among them all, 288 radio-active females were detected. Some of these marked individuals had travelled to the furthest trap 20 miles from the point of release and there were considerable numbers of recoveries at about 2 miles from the centre. Marked individuals were detected from the 1st to the 19th day from the time of release. It is noteworthy that the recaptures did not decrease gradually, for there were marked peaks. As to the male mosquitoes, only 19

were recaptured, all of them within a few days of the time of release : during that period none had travelled more than 2 miles.

[The author's discussion of his results and indeed of the distribution and migration of insects in general is interesting, and should be studied in the original. It seems that he is apologetic for the esoteric language in which he endeavours to express himself, for he provides a footnote claiming that the word " appetence " is in the dictionary and attempting to justify the derivative " appetentially ", a word which may be swallowed, though hardly with a good appetite.] *P. A. Buxton*

GJULLIN, C. M., LINDQUIST, A. W. & BUTTS, J. S. **Absorption of Radioactive DDT by Resistant and Nonresistant Mosquitoes.** *Mosquito News.* 1952, Sept., v. 12, No. 3, 201–5.

Mosquito larvae and pupae were exposed to either water treated with a film of kerosene containing radio-active DDT or to acetone /water suspensions of the insecticide. The radio-active insecticide had been prepared by random substitution of C^{14} in the benzene ring of the DDT molecule, and the radio-activity determined with a commercial type of windowless gas flow counter attached to a scaler.

Tests at 70°F. were made on batches of 300 non-resistant *Aëdes vexans* and *Aëdes sticticus* fourth instar larvae and the radio-activity determined after 24 hours. With both preparations the radio-activity of the larvae increased as the dosage was raised, and a table of detailed results is given. As an example, with a kerosene solution containing 0·43 μgm. DDT per sq. in., applied on 700 ml. of tap water in an 800 ml. beaker, a 54 per cent. mortality occurred, the living larvae having absorbed 0·0028 μgm. and the dead larvae 0·0037 μgm. of DDT each. In the case of pupae a kerosene solution containing 6·6 μgm. per sq. in. gave a mortality of 66 per cent. with the living pupae having absorbed 0·0108 μgm., and the dead pupae 0·0259 μgm. of DDT each. As the pupae became affected by the insecticide their erratic movement caused greater contamination of their bodies with the oil film and hence accounted for the greater absorption. In these tests attention is drawn to the large amount of insecticide needed in the oil film compared with the amount actually used. It is calculated that with a DDT oil film to give approximately 50 per cent. kill only 4 per cent. of the DDT is used by a large population under normal conditions.

With 300 larvae in 100 ml. of acetone /tap water suspension containing 0·017 ppm of DDT, an 88 per cent. kill occurred, the living larvae having absorbed 0·0027 μgm. and the dead 0·0022 μgm. of radio-active insecticide per insect. With pupae a concentration of 0·5 ppm gave a 34 per cent. kill with 0·011 μgm. absorbed by both individual living and dead pupae. Larvae killed with chloroform before exposure to the suspension for 24 hours absorbed two-thirds as much insecticide as living larvae, indicating that the DDT is mainly absorbed and that little is ingested. The authors found that non-resistant larvae had the ability to absorb nearly twice as much DDT at 90° as at 70°F. with less mortality.

Acetone water suspensions were used for absorption tests on DDT-resistant and non-resistant *Aëdes nigromaculis* fourth instar larvae collected from the Merced County and Fresno County of California respectively. When 300 larvae were used in 200 ml. of suspension containing 0·1 ppm of DDT, 11 and 100 per cent. mortality occurred with the two strains, 0·325 μgm. being absorbed per larvae in the resistant strain and half the amount in the susceptible strain. Bioassay of the extracts of these larvae with second instar larvae of *Aëdes vexans* and *Aëdes sticticus* indicated that both resistant and non-resistant larvae had degraded a large amount of DDT to non-toxic substances. However,

the extracts were not bioassayed until 6 months after preparation, and it is likely that there had also been natural deterioration of the toxic material during this time. *Thomas E. Fletcher*

BROWN, A. W. A. **Rotary Brush Units for Aerial Spraying against Mosquitoes and Black Flies.** *J. Econom. Entom.* 1952, Aug., v. 45, No. 4, 620–25 2 figs.

In this paper details are given of tests on the suitability of a rotary brush unit on a Dakota DC3 aircraft for controlling adult *Aëdes* mosquitoes in sub-arctic spruce forest. Although the straight emission pipe, with or without air scoop, is satisfactory for operation against larvae, it gives too coarse a droplet " spectrum " to be economical against adults. However, a sheaf of rotary brushes driven by an outboard propeller and fitted on to the straight emission pipe avoids production of coarse droplets. When the aircraft flies at 150 m.p.h. the unit, which consists of either 5 or 3 brush discs in these experiments, rotates at 2,500 rpm. The rate of emission is more regular than with a straight emission pipe alone, for it does not vary greatly with the hydrostatic head in the tank.

Details are given in tables of the droplet size, dosage deposited and material remaining airborne on a line of sampling points running downwind and cross-track of the aircraft, for both the 5- and 3-brush assemblies. With a 5-brush assembly on the unit, the droplet spectrum, with 10 per cent. DDT in poly-methylnapthalene and fuel oil emitted at 1·05 gall. per sec., when the aircraft flew at 150 m.p.h., showed a mass median diameter of 195 μ. With a 3-brush assembly emitting at 0·58 gall. per sec. the mass median diameter was 180 μ. No droplets were greater than 315 μ in diameter.

Spraying runs were made 300 yards apart at a height of 100 ft. A 10 per cent. DDT solution with a 5-brush assembly delivering 0·22 lb. DDT per acre gave the most satisfactory and economical control of both adult mosquitoes and black-flies. A 98·7 per cent. reduction of mosquitoes was obtained. The reduction of black-flies was not less than, and probably considerably more than 80 per cent. because spraying took place in a period of rapidly rising numbers. Reduction of the dosage to 0·11 lb. per acre, by spraying 5 per cent. DDT, resulted in inadequate control, the average reduction of mosquitoes and black-flies being 87 and 24 per cent. respectively. When 20 per cent. DDT was dispersed by the 3-brush assembly at 0·27 lb. per acre the average reduction of mosquitoes was 96·5 per cent. and of black-flies 87 per cent.

The rotary brush unit has 4 distinct advantages over the straight emission pipe. First, better control of mosquitoes is obtained with an average of 99 per cent., compared with 85 per cent. Second, flying time is economized for more concentrated solutions are dispersed at a wider interval, so that 3·4 sq. miles may be treated in one flight, compared with 1 sq. mile when spraying a dosage of 0·25 lb. of DDT per acre. Third, owing to the fineness of the spray, the application may be made at 100 ft. at nearly all wind speeds even over dense woodland, the height being only increased when the cross-wind component falls below 4 m.p.h. Lastly the use of more concentrated sprays allows considerable economy in diluent. *Thomas E. Fletcher*

KOSTICH, D. Y. **Golubac Fly** (*Simulium columbaczensae*) **in Yugoslav Danubian Region.** [Miscellanea.] *Acta Tropica.* Basle. 1952, v. 9, No. 3, 264–9, 1 fig.

The breeding place of *Simulium columbaczensae* is located exclusively in the region of the " Iron Gate ", that is from Golubac in the west to Kladovo in the

east. In this region the Danube flows very swiftly, in certain places reaching a speed of more than 4 metres per second (about 9 miles per hour), and provides a highly specialized environment very suitable to large-scale breeding of this species of *Simulium*.

The female begins laying in May and oviposition is completed by the end of June. The eggs are deposited on rocks and stones in the course of the river, some in shallow water and some up to depths of 190 feet ; the first larvae appear in the late winter and early spring. The author has found that the larval and pupal stages of the deeper-laid eggs are considerably prolonged, adults not appearing until late April and early May. These later adults are associated with disastrous mortality of livestock. They inject toxic substances from the salivary glands into animals on which they feed.

Only females of *S. columbaczensae* attack animals and man and are said to be most aggressive in the early morning and about sunset ; they prefer a humid atmosphere and seek shelter during the daytime among grass and thickets beside brooks and in woods. The number of hatched insects greatly varies from year to year, depending upon climatic conditions.

It has been estimated that cattle fatality rate caused by bites of these flies is greater in localities farther away from their breeding places since the aggressiveness of the insect increases with the tedious journey. All kinds of animals are bitten, primarily cattle. Cases in man are seldom fatal, but grave symptoms are produced in livestock often leading to death. A varied clinical picture is presented, more pronounced where large numbers of bites occur. Intense restlessness, particularly of cattle, is characteristic. The bite produces a swelling which spreads and is painful to palpation, toxic symptoms follow, in severe cases death ensues within 30 minutes to 2 hours, in lighter cases complete recovery within 1–2 days. Surviving animals show a fair degree of immunity.

Autopsy shows particularly invasion of the respiratory tract. Little is known of the nature of the toxic substances and no results have been obtained by use of convalescent animal sera. *Anne Hudson*

DAVIES, D. M. **The Population and Activity of Adult Female Black Flies in the Vicinity of a Stream in Algonquin Park, Ontario.** *Canadian J. Zool.* 1952, Oct., v. 30, No. 5, 287–321, 27 figs. [19 refs.]

A study of the black fly population in the vicinity of Costello creek, Algonquin Park, Ontario, was made during the fly seasons (May to August) of 1946 and 1947. Daily collections were made at a point near the stream, with the use of a standard method of aerial sweeping with a net. Rainfall, relative humidity, and air temperature were recorded at the same time. The numbers of flies collected were calculated as a 5-day moving average of the daily means (an average of 5 daily means, including the 2 days preceding and following the figure for the day) to minimize errors. Additional observations made during 1947 and 1948 on the activity of the flies included a study of attraction, as shown by a second collection made 5 minutes after the first, and also counts of landing and biting on an area of the observer's skin during successive 2-minute periods. These observations were accompanied by records of wind speed, evaporation rate, and atmospheric pressure.

The majority (about 90 per cent.) of the flies collected were *Simulium venustum*, with smaller numbers of 9 other species of Simuliidae. Flying activity showed a daily rhythm corresponding with variation in temperature, saturation deficiency, and wind speed, with a small peak in the morning and a larger one in the evening. Optimum flying conditions were at 60–80°F., with low evaporation rate, wind speed about 1 m.p.h., and illumination above 300 foot-candles.

Attraction did not vary with any of the meteorological factors tested, and biting, in the shade, varied only with rate of change of atmospheric pressure. Landing on the host was at its minimum at 65–75°F., and was higher at moderately high evaporation rates than at low rates. In direct sunlight, landing decreased to one-half and biting to one-quarter of that in the shade.

There is a nine-page statistical appendix analysing the " Biting/Landing " ratio. *A. J. P. Goodchild*

VARGAS, L. & DÍAZ NÁJERA, A. Nota sobre los simúlidos de México y su distribución geografica (Diptera : Simuliidae). [**Note on Simuliidae of Mexico and their Geographical Distribution**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1951, Dec., v. 12, Nos. 1/4, 89–100.

VARGAS, L. Lista de los *Culicoides* del mundo (Diptera. Heleidae). [**World List of** *Culicoides*] Reprinted from *Rev. Soc. Mexicana de Hist. Nat.* 1949, Dec., v. 10, Nos. 1/4, 191–218. [Numerous refs.]

ORTIZ, I. & MIRSA, Marie. Estudios en *Culicoides* (Diptera, Ceratopogonidae). VIII. Sobre una neuva especie del Grupo *haematopotus* : *Culicoides venezuelensis* n. sp. [**Studies on Culicoides. VIII. A New Species,** *C. venezuelensis*] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1950, Jan., v. 2, No. 1, 137–44, 12 figs. on 3 pls. English summary (5 lines).

LE GAC, P., FLOCH, H. & CHASSIGNET, R. Présence de *Phlebotomus* (*Larroussius*) *perniciosus* Newstead 1911 et de *Phlebotomus* (*Larroussius*) *ariasi* Tonnoir 1921 à la Théoule (Alpes-Maritimes). [**Presence of** *Phlebotomus perniciosus* **and** *P. ariasi* **at Théoule (Alpes-Maritimes)**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 5, 618–19. [14 refs.]

VARGAS, L. & DÍAZ NÁJERA, A. Nota sobre los flebotomos de la zona de Iguala, Estado de Guerrero. (Insecta Diptera). [**Note on** *Phlebotomus* **in the Iguala Region, Mexico**] Reprinted from *Rev. Investig. Clin.* 1952, Jan., v. 4, No. 1, 47–53. [12 refs.]

The English summary appended to the paper is as follows :—

" In the region of Iguala, State of Guerrero, Mexico, which is neotropical, hot, semi-dry, with dry winter and spring, and at an altitude of about 800 mets., some phlebotomus were collected inside the houses. It was possible to identify the following species : *Phlebotomus anthophorus* Addis (1944) ; *P. cayennensis cayennensis* Floch & Abonnenc (1941) ; *P. cayennensis maciasi* Fairchild & Hertig (1948) ; *P. chiapanensis* Dampf (1947) ; *P. diabolicus* Hall (1936) and *P. texanus* Dampf (1938). The life-cycles of these species are not known. Most of the specimens belonged to *cayennensis cayennensis*, *Chiapanensis* and var. *cayennensis maciasi*."

VARGAS, L. & DÍAZ NÁJERA, A. *Phlebotomus pratti* n.sp. de Iguala, Estado de Guerrero (Insecta : Diptera). [*Phlebotomus pratti* **; a New Species from Iguala, State of Guerrero, Mexico**] Reprinted from *Bol. Inst. Estud. Méd. y Biol.* 1951, Jan.–June, v. 9, Nos. 1/3, 19–23, 1 fig. English summary (8 lines).

ORTIZ, I. Notas en Flebotomus (Diptera, Psychodidae). I. Sobre la armadura genital del macho de *Flebotomus panamensis* Shannon, 1926. [**Notes on** *Phlebotomus*. **I. The Genital Armature of the Male** *P. panamensis*] *Archivos Venezolanos de Patol. Trop. y Parasit. Méd.* 1950, Jan., v. 2, No. 1, 83–8, 6 figs. on 2 pls.

SABROSKY, C. W. **House Flies in Egypt.** *Amer. J. Trop. Med. & Hyg.* 1952, Mar., v. 1, No. 2, 333–6.

Eleven species and sub-species of *Musca* were taken in Lower Egypt during 6 weeks in June and July, 1950. *M. domestica vicina* was the dominant sub-species. *M. d. cuthbertsoni* and the non-gregarious *M. sorbens sorbens* were frequently found. Other forms were infrequent or rare.

Although general collections from different places consisted mainly of *vicina* and *cuthbertsoni*, it was usually *sorbens* which was troublesome as a nuisance to people. *M. sorbens* was bred out in large numbers from human stools but *vicina* was the common form in latrines, compost heaps, or waste from animal sheds. During the period of observation, " fuel cake " was not a productive site for *Musca* although a few *vicina* bred in it.

The characters used for differentiating the various forms of *Musca domestica* (*M. domestica domestica*, *M. d. vicina* and *M. d. cuthbertsoni*) are discussed (but not illustrated). A few males, which could be classified as *M. d. domestica*, were taken during this survey but it is known that extreme variants of bred-out *vicina* resemble the type male. The converse is known for type *domestica* from temperate regions. It is concluded that populations, and possibly even individuals, of *M. d. domestica* do not occur in Egypt. *D. S. Bertram*

HAMPTON, Ursula M. **Reproduction in the Housefly** (*Musca domestica* **L.**). *Proc. Roy. Entom. Soc. of London.* Ser. A. 1952, June 16, v. 27, Pts. 4/6, 29–32. [12 refs.]

This paper deals with the effects of the male flies on the reproductive and general physiology of the females of *Musca domestica*. The length of the pre-oviposition period, the frequency of oviposition, the number of eggs per batch laid, and the age of parent females are compared for females paired with a male, fertilized females from which the male was removed, and virgin females. No significant effects were detected following the removal of a male after normal copulation, but virgin females took 12·1, as opposed to 4·5 days in normal fertile females, to lay eggs. Normal fertile females lived on the average 26·3 days (range 18 to 36 days) ; virgins survived for 20·8 days (range 6 to 27) ; the differences in length of life were not statistically significant but there was some indication of prolonged survival when copulation was delayed until late in life. Early death in virgins appeared to be due to their becoming egg-bound.

Varying numbers of testes were implanted into virgin females, and a series of controls were set up in which the transplant operation was performed but no testes were inserted into the flies. Both groups survived for shorter periods than normal flies ; their pre-oviposition period was less than that of virgin flies. Thus, life and the pre-oviposition period were shortened by the stimulus of operation. The transplants of 1 to 6 testes failed to increase egg production to that of normal fertilized females. *D. S. Bertram*

SCHOOF, H. F., SIVERLY, R. E. & JENSEN, J. A. **House Fly Dispersion Studies in Metropolitan Areas.** *J. Econom. Entom.* 1952, Aug., v. 45, No. 4, 675–83, 2 figs.

This work was carried out as part of a research programme on the relationship of flies, *Musca domestica*, to outbreaks of anterior poliomyelitis. The work was done in the town of Phoenix, Arizona. The town is well developed and maintained but the adjacent country area is ill-kept, consisting of poor houses, animal pens and privies, with the addition of meat packing factories and

garbage dumps ; nor is there organized refuse collection in this area. The predominant fly is *M. domestica*, breeding extensively in the country area.

Several thousand flies were captured at the predetermined site of release and " marked " by being allowed to feed over 12 to 23 hours on a solution of milk, honey, and water containing 1 millicurie of radio-active phosphorus (P-32) per litre. They were released always at twilight and dispersion was considered to begin next day after dawn. Small baited traps were distributed in concentric rings from the dispersal point at distances of 0·5 mile (6 traps), 1 mile (12 traps), 2 miles (13 traps) and 3 miles (19 traps). At distances exceeding 1 mile the rings were incomplete, ending at a river which crossed the area. On each ring, or partial ring, traps were 0·5 mile apart with some minor deviations to ensure a suitably attractive site being sampled. In a later test, in which the traps were sited in a slightly different way, the maximum distance of flight tested was 5 miles. In this test the baited fly-traps were set at points considered to be of equal attraction to flies since, in the first test, most of the flies were recovered at traps at animal sheds which could be shown to be particularly attractive sites.

The principal zone of dispersion was found to be within 1 mile of the release point, although small numbers flew as far as 5 miles. About 48 hours were required for flies to penetrate to 2 or 3 miles, and 72 hours for greater distances. Recoveries declined after 3 days, none being taken between 7 and 15 days after release. Either they had died, dispersed further or excreted their radio-active content.

It is stressed that if in fly-control work within a city, attention is directed only to eliminating breeding places within the city and no regard is given to other sites attractive to flies, infiltration to these sites from breeding places outside the control area must be expected. *D. S. Bertram*

Dicke, R. J., Moore, G. D. & Hilsenhoff, W. L. **House Fly Response to Volatilized Chlorinated Hydrocarbon Insecticides.** *J. Econom. Entom.* 1952, Aug., v. 45, No. 4, 722–5.

Certain commonly used chlorinated hydrocarbons give good residual control of house-flies under laboratory procedures in which the insects are enclosed or confined to treated surfaces. However, when a box cage screened at one end is used, thus permitting test flies to select untreated as well as treated surfaces for resting sites, the control results may be relatively poor. In this way it was demonstrated that panels treated with deposits of BHC, chlordane and DDD water suspensions were less toxic than panels treated with water suspensions of DDT or methoxychlor. The residues from water suspensions were also observed to be appreciably more toxic to flies than kerosene solutions. It was assumed that test procedures which confine insects to treated surfaces did not differentiate between contact toxicity and fumigation or account for the attractiveness or repellence of the deposit. It was suggested that the poor control under field conditions of water suspensions of BHC, chlordane and DDD, and kerosene solutions of DDT, methoxychlor and chlordane appeared to be due to a repellence of flies from the treated surface, while the fumigation effect had little control value in the open. Attention was not, however, drawn to the fact that on a porous surface far more insecticide is available with a water suspension than when a kerosene solution is used, for the kerosene solution is largely absorbed and is no longer available to the insect, while the crystals of the suspension remain on the surface.

The attractiveness and repellency of several insecticides were tested with the use of a simple Y tube olfactometer. A stream of air of constant humidity and temperature was divided and passed through a set of two jars, one empty and

the other containing the dry insecticide, and connected to the two arms of a Y tube. Flies were introduced at the stem and after 90 minutes in the dark, the position of the flies was recorded under a red light.

A proprietary water-wettable powder was tested as well as the technical grade of several toxicants. Two grades of kerosene were also tested to determine their effect as solvents. A table of detailed results is referred to but does not appear in the paper. Methoxychlor and DDT were attractive while dieldrin and technical grade of DDD were found to be neutral in effect. Heptachlor, toxaphene, difluoro-diphenyl-trichlor ethane (DFDT), the wettable powder of DDD, aldrin, lindane, BHC, and chlordane, were all repellent, varying from moderate repellence for heptachlor to extreme repellence for chlordane. In some cases the wettable powder was more repellent than the technical grade, indicating that adjuncts with a repellent effect may have been used, or that the preparations were more volatile. The authors do not state if the crystal sizes of the technical grade and wettable powder were the same, for a difference could account for a change in volatility. Considerable fumigation effect was observed for heptachlor, BHC and lindane, again the wettable powders appeared more volatile than the technical grade. There appeared to be no correlation between repellency and fumigation effect. Kerosene was extremely repellent and appears to be a poor solvent for fly sprays used as residual insecticides.

Thomas E. Fletcher

SERGENT, Ed. Répartition géographique de la " thimni ", myiase oculo-nasale de l'homme, due à l'oestre du mouton. [**Geographical Distribution of " Thimni ", a Form of Human Oculo-Nasal Myiasis due to** *Oestrus ovis*] *Bull. Acad. Nat. Méd.* 1952, v. 136, Nos. 27, 28, 29 & 30, 519–20.

As far back as 1907, the author described a form of myiasis well known in the mountainous regions of Algeria : it is caused by *Oestrus ovis* and is locally known as *thimni* [this *Bulletin*, 1913, v. 2, 531]. It is common in certain districts where sheep are rare and the human population is dense and is unknown under the reverse conditions. The author has studied the distribution by means of a questionary addressed to ophthalmologists throughout the world. As a result he has obtained data regarding the conditions in which the parasite attacks or does not attack man. Examples of the extremes are given from parts of Algeria. Figures are also given from Australia, where in the last statistics seen, there were 123 million sheep and 7 million people. The 15 scientists and clinicians addressed by the author had never known of a single case throughout Australia where man had been attacked by *Oestrus ovis*.

The author adds that in man only first stage larvae are found on the mucous surfaces : the infestation in man always miscarries—" *ce sont des générations perdues* ". In sheep, which do not defend themselves, the larvae undergo complete development, deriving nourishment from the mucous surfaces. They fall to the ground, pupate in the soil and thus perpetuate the species.

It is suggested that in areas of dense human population, such as large towns, the *O. ovis* which follow flocks of sheep, lose their way in the busy streets, and females requiring to lay eggs deposit them on human beings if they cannot find sheep.

H. J. O'D. Burke-Gaffney

PICK, F. Sur la rencontre des larves du genre *Lucilia* sur la peau intacte d'un homme vêtu convenablement. [**Presence of** *Lucilia* **Larvae on the Intact Skin of a Fully Clothed Man**] [Miscellanea.] *Acta Tropica*. Basle. 1952, v. 9, No. 3, 277–8.

VARGAS, L. Las especies de *Psorophora* (Diptera : Culicidae). *Psorophora* (*Janthinosoma*) *fiebrigi* Edwards, 1922. [**Species of** *Psorophora*. *P. fiebrigi*] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1951, Dec., v. 12, Nos. 1/4, 53–8, 1 fig.

GEIGY, R. & KRAUS, C. Rüssel und Stechakt von *Rhodnius prolixus*. [**The Proboscis and Biting Mechanism of** *Rhodnius prolixus*] [Miscellanea.] *Acta Tropica*. Basle. 1952, v. 9, No. 3, 272–6, 1 fig.

DIAS, J. A. T. S. Subsídios pras o estudo da fauna ixodológica da província do Niassa. [**Data on the** *Ixodes* **Population of Niassa Province, Portuguese East Africa**] *Anais Inst. Med. Trop.* Lisbon. 1951, Dec., v. 8, No. 4, 563–614, 18 figs. & 1 folding map. [25 refs.] English summary.

LIPOVSKY, L. J. **A Washing Method of Ectoparasite Recovery with particular reference to Chiggers (Acarina-Trombiculidae).** Reprinted from *J. Kansas Entom. Soc.* 1951, Oct., v. 24, No. 4, 151–6.

It is a tedious and difficult matter to remove parasitic mites and other minute delicate Arthropods from the hair or feathers of their hosts. The author describes in detail an ingenious method, based on chilling the dead mammal or bird, which probably has the effect of numbing and loosening the parasites. The animal is then brought to room temperature and washed in a solution of some surface-active detergent. In the case of a mouse it is shaken up in a considerable volume of liquid in a glass wide-necked bottle. With larger animals it is best to shake and wash the skin or even parts of the skin.

The method is illustrated by a study of the recovery of larvae of *Trombicula* from " rabbits " (of which no Latin name is given ; they appear to have been some wild species caught in Kansas).

It is remarkable that many of the mites recovered will continue to live in the watery detergent solution for some weeks at a temperature just above freezing point, so that the specimens might be available for biological investigations as well as for identification. *P. A. Buxton*

BOIRON, H. Acquisitions récentes sur les puces domiciliaires de la ville de Dakar. [**Recent Observations on Domestic Fleas in Dakar**] *Bull. Soc. Path. Exot.* 1952, v. 45, No. 5, 688–94.

VARGAS, L. Nota acerca de las pulgas mexicanas (Insecta : Suctoria). [**Note on Mexican Fleas**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1951, Dec., v. 12, Nos. 1/4, 81–7. [25 refs.]

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

ROBERTSON, A. S. **Height and Weight Tables of Pre-School African Native Children.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1952, Sept., v. 46, No. 5, 560–63.

The tables give height and weight records for boys and girls aged 1–7 years. The data were obtained on apparently healthy and well-fed African children in regular attendance at a crèche while their mothers were working. Although only 170 children are represented in the tables, they provide a standard which may be useful to others interested in the growth of African children.

R. Passmore

MacKay, D. H. & Martin, W. J. **Dentition and Physique of Bantu Children.** *J. Trop. Med. & Hyg.* 1952, Dec., v. 55, No. 12, 265–75. [14 refs.]

"The deciduous teeth of the Bantu children examined erupted a little later and were shed earlier than those of British infants. The permanent teeth appeared earlier than in British, Northern European or American children. The incidence of caries was very low compared with that found in England. At ages over 10 about three-quarters of the Bantu children were free from caries.

"The Bantu children were smaller on the average than either the London or American children. The Bantu girls were about 4 in. shorter than white girls and the boys were about 4 in. shorter at the younger ages and about 6 in. shorter at the older ages than the white boys. The Bantu girls were 7 lb. below the weight of the American girls at age 4 and 16 lb. below at age 17 while the Bantu boys were 7 and 34 lb. lighter at these ages than the American boys."

Lorrain, J. M. Les Tahitiens d'aujourd'hui et la médecine. [**The People of Tahiti and their Medical Problems Today**] *Méd. Trop.* Marseilles. 1952, Sept.–Oct., v. 12, No. 5, 571–5.

Huttel, W. & Huttel, Nancy. Formulaire Djèdje. [**A Djedje Formulary**] [Miscellanea.] *Acta Tropica.* Basle. 1952, v. 9, No. 4, 345–56.

The authors refer to empirical treatments used by "medicine men" in Africa, then present a list of over 100 plants used therapeutically by the Djedje or Gouns of Lower Dahomey. The plants are classified under botanical families and species, together with their vernacular names, the diseases in which they are used and the method of preparation.

The range of use will be familiar to those working in Africa; for the most part, the plants are used in such conditions as helminthic diseases, conjunctivitis, intestinal complaints, inflammations, sexual disorders and gonorrhoea. This is a useful addition to the known lists of indigenous African plants used by local "healers". *H. J. O'D. Burke-Gaffney*

Kemper, H. Daten zur Geschichte der hygienischen Zoologie. [**Data on the History of "Hygienic Zoology"**] *Ztschr. f. hyg. Zool.* 1952, Apr. & May–June, v. 40, Nos. 4 & 5/6, 109–28; 138–74. [28 refs.]

This remarkable paper collects an immense amount of information, in chronological form, on the history of diseases conveyed by living organisms. After an introductory discussion, the author lists the principal diseases or agents of disease, or methods of prevention concerned, giving the years to which reference is made in the notes which follow.

These notes take the form of brief references to the outstanding relevant events, year by year, from 1400 to 1944. They begin with references to studies in Basle in the former year and end with work on DDT. Because of this abrupt ending, much of the discovery of the recent war years and since does not appear and there are few references to the British work about that time.

However, the landmarks in epidemiology, microscopy and medical biology are there and whether one wishes for a reference, for example, to Fracastoro, Leeuwenhoek, Robert Koch, Lady Montague, Manson, Ross, Theobald Smith, Prowazek or Walter Reed, it will be found.

The paper is a fascinating chronological narrative which medical biologists may read with profit. *H. J. O'D. Burke-Gaffney*

HOENIG, W. & MOHR, W. Elektrokardiographische Studien beim Goldhamster, einem neuerdings viel verwendeten Laboratoriumstier. [**Electrocardiographic Studies on the Golden Hamster**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1952, Oct., v. 4, No. 1, 117–21, 6 figs.

The English summary appended to the paper is as follows :—

"100 normal Syrian hamsters of varying ages were subjected to electrocardiography in order to establish the standard type of heart action for further clinical studies. Technique is described. Electrocardiograms obtained show conformity and in their main features resemble the human electrocardiogram."

BOOK REVIEW

ROGERS, Leonard [K.C.S.I., C.I.E., LL.D., M.D., B.S., F.R.C.P., F.R.C.S., F.R.S.] & MEGAW, John W. D. [K.C.I.E., B.A., M.B., Hon.D.Sc., Queen's University, Belfast], with the collaboration of George R. McROBERT [C.I.E., M.D., F.R.C.P.]. **Tropical Medicine.** Sixth Edition. pp. viii + 560, 2 coloured pls. & 86 text figs. 1952. London : J. & A. Churchill Ltd., 104, Gloucester Place, W.1. [40*s*.]

In writing this edition the authors have kept specially in mind the needs of medical students and of practitioners who work without the help of modern laboratories. Special stress has therefore been laid on methods of diagnosis requiring only a microscope or a few simple appliances. Few can doubt the need of such a volume for there is a wide gap between the several brief guides and large textbooks available. The material is well selected and arranged, the book is clearly written and readable, and there are 86 useful illustrations. In this edition—the first for 8 years—a great deal of revision has been carried out and many recent advances have been incorporated. There are few points warranting criticism, and perhaps the foremost of these is that even more radical pruning of out-of-date material could well have been carried out. The old-fashioned milk diet for sprue, for instance, is given prominence and dry cupping over the kidneys is mentioned as a remedy for deficient urinary secretion in cholera. In some instances, too, more information concerning drug dosages, details of treatment and management of patients might have been given with advantage. There are a few factual errors in the text.

This is the first edition of the work in which Sir George McRobert has collaborated, and he is responsible for very valuable contributions on malaria, dietetic diseases, and helminthic diseases.

The book has served a useful purpose for 22 years and the present volume is a worthy successor to previous editions. *A. W. Woodruff*

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